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INDISPENSABLE
ORTHOPÆDICS

F. CALOT

SECOND EDITION



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INDISPENSABLE ORTHOPÆDICS

A HANDBOOK OF TREATMENT

BY

F. CALOT

CHIEF SURGEON TO THE HÔPITAL ROTHSCHILD, HÔPITAL CAZIN
HÔPITAL DU DÉPARTEMENT DE L'OISE, INSTITUT
ORTHOPÉDIQUE DE BERCK, ETC.

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BY

A. H. ROBINSON, M.D., M.R.C.S.

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ACQUIRED DEFORMITIES, NON-TUBERCULOUS

CHAPTER VIII

SCOLIOSIS

AMONGST the Orthopædic affections, Scoliosis is, I believe, that which most embarrasses the practitioner.

In the presence of the multiple and diverse theories held by authors as to the nature of this malady, he does not know what to believe : among the different treatments proposed, he does not know which he must choose, and if he choose one, he does not know exactly in what way to apply it, in order to reap some benefit. In the end he does nothing.

I call it doing nothing, and avoiding doing anything, when he confines himself to prescribing strengthening wines, and furnishing the address of a manufacturer who will make some kind of corset, and thus frees himself from all responsibility.

How **disastrous** to the patient is this **indifference of the practitioner** who sees the Scoliosis from the onset, from the moment when it is yet in an early stage !

And how annoying it must be to the practitioner himself, who will be held in poor esteem by the parents, when they see their child become more and more deformed without anything being done to prevent the progress of the deformity !

I would like to protest against this tendency, and to persuade practitioners that they are able, and ought henceforth, to assume a different attitude with regard to the “**essential scoliosis of adolescence.**” They must look the malady in the face, frankly, bravely, and deal with it with the same confidence they deal with the other orthopædic affections. They will triumph over this malady also, if they know how to **track** it from its **earliest**

stage, and apply to it without delay the treatment we are going to describe.

In this description I have endeavoured to be explicit, practical and useful. Having made use of all the treatments, I will describe, without any biased opinion, that which appears to me the best. But beforehand, I ought to point out the means of tracing scoliosis from the beginning.

Diagnosis.—I shall deal, in this chapter, only with the essential scoliosis of adolescents, or **ordinary scoliosis**.¹ It is easy to recognise the existence of the condition from its onset. There is brought to you an adolescent, nearly always a young girl, who, her parents tell you, has held herself badly for some time, in spite of their remarking upon it; or the mother has noticed in undressing her—more often it is the dressmaker or the staymaker who has made the remark—that the child has one **shoulder** a little **higher** than the other, or one hip **projecting**. This has been a revelation to the parents, who had had no suspicion of any deformity up to this time. It must be overgrowth, the parents hasten to add, for the child has shot up very quickly, too quickly: that has fatigued her.

In fact, you see a young girl of from 12 to 14 years of age, rather emaciated, a little anæmic, somewhat flabby and easily tired, catamenia not yet appeared, or, if so, irregularly.

When a child is placed before you with these indications, you think at once of the existence of scoliosis. You must see to this

¹ Thirty-six varieties of Scoliosis have been described; the essential or ordinary, the rachitic, the constitutional, the static, the neuro-pathic, etc. One can reduce all these varieties to the four following:

1st. **The scoliosis of adolescence**, of which we are now speaking.

2nd. **Rachitic scoliosis**—that which begins at, or rather is recognised at, 3 years, 5 years, 8 years. It is distinguished by important characteristics, and by its very grave prognosis: it will be studied in the chapter **Rachitic Deformities**, Chap. X.

3rd. **Symptomatic scoliosis**, which includes:—

(a) *Static scoliosis*, that is, symptomatic of an inequality of the lower limbs (coxitis, congenital luxation of the hip, infantile paralysis, etc.), in which cases one must treat the maladies, or compensate the inequality of the limbs with a boot;

(b) *Symptomatic scoliosis*, symptomatic of some other affection altogether (and these causal affections are very numerous); empyema, thoracic affections, hemiplegia, the contractions of torticollis, etc.

4th. **Scoliosis due to faulty development** of one or several vertebræ or ribs.

forthwith by proceeding to **examine** the vertebral column, the **entire back being uncovered**. Whilst the mother is undressing her (which always takes some time) you interrogate her as to the **hereditary** or **personal antecedents** of the child.

Sometimes the mother declares there was an aunt, or a grandmother, who had a deformity of her spinal column. Sometimes the mother tells you nothing; but her own figure, her rather round back, her uneven shoulders, speak for her.

As to personal antecedents, never omit to enquire how the child has been brought up. You will generally learn that she has been bottle-fed, or had a series of indifferent or manifestly bad nurses. Enquire if she has had **digestive trouble**, because in these children repeated enteritis is nearly always the rule, also constipation with a large abdomen and offensive stools. Make a note of previous debilitating diseases, such as whooping cough, broncho-pneumonia, eruptive fevers, etc.

Remembering that **scoliosis** is the "**school disease**" (the bad position often being brought about at school, or discovered there), inform yourself of the number of the child's class hours and of her attitude in writing.

But now she is undressed, the back in full view, in front of you, the arms close to the body. You tell her to fix her eyes straight before her, on some point you indicate.

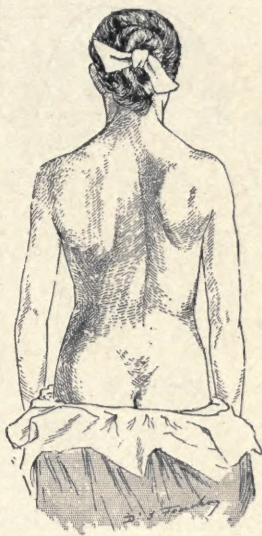


Fig. 605.—Scoliosis. Single convex curve on the right side.

On looking at her back you are struck by the **difference in height** of the two **shoulders**, by the **absence of symmetry** between the **two scapulæ** (one is much nearer the middle line than the other), by the **projection** of one of the **hips**, and by the **difference** of the **two triangles** which **the arms form** with the corresponding side of the trunk and the pelvis. These signs seem to increase—if you leave the girl for a time upright.

They strike one often more than the deviation in the line of the spinous processes; the deviation is, in fact, only a little or not at

all apparent. To reveal it, you trace the line of the spinous processes with a crayon, or, more simply, by pressing with your index finger over all the processes from above downwards. A rather vigorous pressure in this way, and repeated two or three times, leaves a red line which gives you the line of the **spine**, and you easily recognise that the line is **no longer straight**, but that it **describes a curve** towards the right or towards the left, sometimes opposite the lumbar, more often opposite the dorsal region (fig. 605).

Make the child bend forwards, the arms hanging; in this position you will see the deviation of the processes become obliterated, but then there will appear a slight arching of the ribs on the convex side of the dorsal spine (fig. 606).

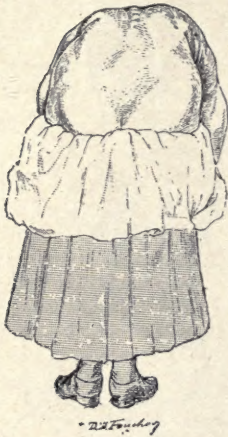


Fig. 606.—Make the patient bend forwards, the arms hanging: one sees, coming into view, the asymmetry produced by the arching of the ribs on the convex side.

Your **diagnosis** of Scoliosis is made.

Nevertheless, you examine the chest, which may be already a little (very little) asymmetrical; percuss and palpate the abdomen to judge of the general condition of nutrition; do not forget to ascertain that there are no ocular troubles, or adenoids, or **inequality of the legs** (measure very carefully).

Differential Diagnosis of Scoliosis

(a) **Normal back**: the positive characters of scoliosis indicated above are wanting here (line of shoulders, projection of hips, brachial triangle, deviated line of spinous processes).

(b) **Pott's Disease** (see Chap. V.). The curve of Pott's disease is **median** (and not lateral); it is not a long curve (as in scoliosis) but an acute projection, a spinous process fallen out of the rank. More than that, in **Pott's disease** there is **pain** on pressure over one or several spines; there is a **rigidity**, a marked **stiffness** of the back: the **two shoulders**, the **two hips**, the **two lateral triangles** are **symmetrical**, at least when the disease is not in an advanced stage, in which case the lateral inclinations may be superadded to the original deformity: but at this period of Pott's disease no confusion is possible.

Such is the almost constant rule. Nevertheless, there exists, in

children in indifferent general condition, scolioses with very slight lateral deviation and even slight pain on pressure over a spinous process: it may be at the meeting-point of two lateral curves superposed; then sometimes the spinous process makes a slight projection (see Chap. V.).

Ascertain the existence of these lateral deviations, more or less distinct above and below the sensitive point: make sure that the movements of the spine are free, and that the median projection is almost nothing and the pain scarcely appreciable, and that will enable you, in **these difficult, but fortunately rare cases**, to make a diagnosis. In doubtful cases, make no positive statement, ask to see the child again: the diagnosis will rapidly become certain, owing to the development of the disease.

Prognosis.—It is necessary to guard you against two prejudices, opposed and contradictory to one another, equally unreasonable, sinister and of old standing. The first is that scoliosis always cures itself. The other, contrary one, is that scoliosis is never cured.

Scoliosis does not become cured spontaneously; or rather, spontaneous cure is so exceptional that it would be foolish to depend upon it and to abstain from undertaking treatment. If, in children of very good general nutrition, particularly boys, one may have seen scoliosis in an early stage, once in a hundred times, arrested of itself, that may not do away with the necessity of active treatment. On the contrary, if there are found at the other end of the scale and in opposite conditions, children who are pale, breathless, rachitic, languid, with grave hereditary defects, in whom the scoliosis is of an acute form and with a tendency, almost insuperable, to become aggravated whatever one may do, the case is just as rare and exceptional, in essential scoliosis at least, and we ought not to take it into account. It is not upon very rare exceptions that a line of action should be based.



Fig. 607.—Scoliosis with a double dorsal curve on the right and a lumbar one on the left.

One may say, and you ought to remember it, that the **future** of your scoliosis **will depend** upon the **period** at which you have **commenced the treatment**, and upon **the way** in which you have carried it out.

Three Degrees.—One has distinguished three periods in scoliosis when left to itself :

1st degree.—Scoliosis with a single curve, to the right or left, dorsal or lumbar, of recent date (fig. 605 and 606).

2nd degree.—Two curves in opposite directions : generally a convex dorsal one on the right and a lumbar convex on the left (fig. 607).

3rd degree.—Three curves exist : a principal and primitive one in the dorsal region, and two secondary, cervical and lumbar, called compensatory, in the opposite direction to the first (fig. 608).

The serious scoliosis of the third degree in the last stage presents veritable “lateral gibbosities,” or the back is bent, with a projection of the ribs resembling the side of the classical melon and a contrary deformity of the front of the thorax. The back in these cases is hopelessly deformed and “beyond repair.”

The Course to Follow.—You can and ought to treat scoliosis of the first and second degree. In fact, you have chiefly to treat scoliosis of the first degree. In your ordinary practice you will see the children at this stage : if the parents do not show their children voluntarily, you should make it a rule to see, every six months, for instance, the backs of all the young girls of the families of which you are the regular attendant. If you treat a scoliosis at once, it will never reach the third degree.

If a neglected child is brought to you with a scoliosis of the third degree (fig. 608), do not attack it ; it would be useless and you would reap only disappointment. The specialist alone can deal with it.¹

I.—TREATMENT OF SCOLIOSIS OF THE FIRST DEGREE

Among the various treatments proposed, which is good, and is there really a good one ? That is the question. Where is the truth among the different opinions held ?

¹ You will find an account of the Abbott method, which is still being studied, in my special *brochure* on the subject, published by Maloine.

We will hasten to tell you ; truth is certainly not in extreme opinions, in opinions arbitrary and absolute. In this subject, we are eclectic, in therapeutics as well as in pathology.

Thus, it cannot always be said, as some would have it, that the essential scoliosis of adolescence is always, not even



Fig. 608.—Scoliosis of the third degree (or, rather, at the time of changing from the second to the third degree).

generally, really rachitic. What we do admit is that there very often exists, in scoliosis, troubles of nutrition presenting some analogy with those engendered by ordinary rickets. In children debilitated by enteritis, or by improper feeding, or by a faulty hygiene, or by a too rapid growth, or by previous illnesses, in the same way as in true rickets, climatic influences,

overloading,¹ bad sitting habit in school, repeated daily and several hours a day—are liable to bring about scoliosis.

The treatment therefore will never be determined by an absolute theory, exclusive, and, until thoroughly investigated, arbitrary. The general treatment, anti-rachitic, reparative, would not be sufficient any more than the local or gymnastic treatment. Our treatment should be at once general and local.

THE GENERAL TREATMENT

This includes: (A) The **feeding** of the child and supervision of its digestive functions; (B) General **hygienic** measures.

(A) In the matter of **feeding**,² prescribe as for an ordinary rachitic, taking the age into account. Allow only foods which leave the minimum of residue, and counteract the intestinal fermentations by the local antiseptics you are in the habit of using.

With the same idea, deal with constipation. Order **massage of the abdomen** and support it with a belt made of several turns of broad Velpeau bandage.

(B) From the point of view of **Hygienic** principles, you will advise the girl afflicted with scoliosis to live as much as possible in the open air. A **stay at the seaside** would evidently be most beneficial, but it can be adopted only by a very small number of families.

Do not forget the usual **medicines**; cod-liver oil, phosphate of lime, syrup of iodine and tannin, etc. But I need not insist on general treatment; that is a chapter which you know as well as I do.

A Word upon School and upon the Patient's Bed

School.—Ought the child to go to school? You know the unfortunate effect of bad sitting in class.

¹ There are scolioses among the quadrupeds. Therefore overloading, as the Germans understand it, is not necessary to produce scoliosis, and the predisposition distinctly exists in certain subjects.

² *Scoliosis* is a *malady of the stomach* quite as much as it is a "school complaint."

Yes, if he is allowed long and frequent recreation, during which he has full liberty to enjoy the amusements suitable to his age, and if, during school hours, the school furniture at his disposal completely satisfies your orthopædic requirements.

Therefore no small flat tables, uniform for everybody, too high for the little, too low for the tall.

In the first case the child is obliged to hang on by his arms



Fig. 609.—Our desk and chair for scoliotiques.

while he writes, pushing up his shoulder ; and, in the second, he bends himself, lying over his copybook, his shoulders depressed.

This mischievous attitude, kept up for several hours a day, without being counterbalanced by anything, ends by becoming permanent in all the subjects who are ever so little predisposed.

It is for this reason that scoliosis truly merits the name of

the "school complaint." It is for the same reason, if the conditions of the school where our scoliotique goes are obviously bad, that it is necessary to withdraw him at least for some months.

What the writing desk ought to be like.—You order a seat with a very high back, by which the patient's head and back are constantly supported over as large an extent as possible, and a desk placed at a distance of from 20 to 25 centimetres away with an inclination of from 20° to 30° , so that his eyes can easily follow the characters drawn by the arm supported by an elbow rest (the head and back remaining in contact with the back of the chair). The feet will be supported on a footstool, at a height which allows the thighs, in the horizontal position, to be at the same height as the seat. This is (fig. 609) the school desk we should use. (Your carpenter can make it.)

We may add that the child ought to become gradually accustomed to upright handwriting, which has not the numerous disadvantages of the slanting variety (see fig. 645).

The Bed.—The child will lie on a flat hard bed (a board under the mattress), without pillow or bolster.

These hygienic precautions, *good for all children, are indispensable for children predisposed*, that is, for candidates for scoliosis, either by heredity, or by the bad condition of their alimentary canal.

When scoliosis already exists, it is necessary to do all this as a matter of course; but it is still more necessary to follow the special treatment for the deformity—which is summed up in two words: gymnastics and a corset.

THE LOCAL TREATMENT

Medical Gymnastics. — Exercises for Straightening.
—Oh! do not be afraid, it is very simple. You need not have been born at Stockholm, nor assume an inspired look, to know that a curved arc is straightened by traction on its two extremities and by pressure made on its convexity.

True, in Scolioses which have been left unattended, secondary

curvatures are produced, and the really “corrective” manœuvres, whether they have much or little effect, have become very difficult to determine. But these Scolioses concern the specialist. Do not undertake their treatment. It is only in the early stage that you will interfere. At the beginning the curvature of the spine is single, and at that time the problem is reduced to straightening the arc. Not only will you **straighten** it, but you may attempt to **inflect it in the direction opposite** to the deviation.

All manœuvres which lead to this result are good. You will easily discern them by simple reasoning or by the modifications which the back of the child undergoes in the course of the different movements which you tell him to perform, or which you yourself perform upon him.

So much for the *gymnastics special* to each case.

You will use besides, *general gymnastics*, the same for all, having for your objective: (a) the **development of the thoracic cage**, by forced inspirations, followed by complete expirations; (b) **the exercising of the muscles of the back and limbs**, by symmetrical movements of the arms, and legs, which all school children know how to make (one, two!); the flexing of the body forwards, backwards, marching to the word of command, dumb-bells, etc.

But you may scarcely be content with these brief indications. To be really useful to you we must be precise and codify, so to speak, all the exercises. Here is a programme easy to follow which I have drawn out for you with my able assistant and



Fig. 610.

friend, Roederer. It has this advantage, that you **can make use of it without special outfit** and without apparatus, in families of moderate means.

It is inspired by two principles which ought to be the two directing ideas of the whole treatment of Scoliosis :

1. **Strengthen the organism.**
2. **Correct the deformity.**

It requires two sittings a day, at nine in the morning and at five o'clock in the afternoon, for instance. Each séance should last from three-quarters of an hour to one hour.

You yourself will preside at the first exercises ; then, after the third or fourth sitting, when you have educated **the mother** as well as the child, she **will be able to take your place satisfactorily.**

You will only have to see the child again once a week or even less often. We remind you that this refers to Scoliosis of the first degree. The example chosen (fig. 610 and following) is that of a boy ¹ of twelve years of age, of feeble constitution, who goes to school ; slight right scoliosis, right shoulder higher than the other.

The gymnastic and redressing exercises comprise **four parts.** The first and fourth are general gymnastics, useful and applicable to all children ; the exercises of the second and third parts are the special treatment for the deformity.

1ST PART.—**Respiratory Gymnastics.**—Duration : 7 to 10 minutes.

Upright.—1st. Make a deep inspiration through the nose, followed by an expiration as complete as possible by the mouth.

2nd. Starting position : Elbows bent and horizontal, hands level with shoulders (fig. 610).

Extend the arms in the form of a cross during inspiration (fig. 611). Return to the starting position during expiration.

3rd. Starting position : The arms hanging by the sides. Raise the arms laterally, first crosswise, then above the head

¹ Although less frequent than in girls, essential scoliosis is far from being rare in boys.

(during inspiration), remaining so for three or four seconds (fig. 612).

Let the arms fall, as far behind as possible, during expiration (fig. 613).

Recommence the series (1st, 2nd, 3rd), for three or four minutes. Afterwards, rest a minute.

Seated.—1st. The same exercise as that performed just



Fig. 611.

now upright (No. 1), the hands being clasped at the level of the pelvis, behind the chair (fig. 614).

2nd. An assistant passes his hands under the child's axilla and raises the thorax at the end of inspiration, which is thus "forced" (fig. 615).

Recommence the first and second, for three or four minutes.

As a general rule, **children do not know how to distend the thoracic cage without special instruction.**

The respiratory coefficient, that is, the difference of the perimeter at inspiration and at expiration, is barely one or two centimetres at the beginning of the treatment.



Fig. 612.



Fig. 613.



Fig. 614.

After two months of these lessons and exercises, the coefficient rises to 4, 5, or 9 centimetres.

Draw the attention of the parents to this ; that is, make them measure the perimeter of the thorax at its maximum amplitude, in forced inspiration, first at the beginning of the treatment, and then at the end of the first or second month ; the comparison will sur-

prise and stimulate them. It is certain that a larger ventilation of the lungs, determining a more complete oxygenation of the blood is, for the child, a condition which improves its general health.

Indeed, **after a few weeks** of these lessons, all children



Fig. 615.

not only **hold themselves better**, but are better. It is manifest to everybody, and is to the parents a great encouragement. This is not immaterial, because it necessitates much perseverance on the part of every one, for many months, to arrive at a successful result.

For the rest, the practice of these respiratory exercises is becoming universal. They will soon be, if they are not already, part of the daily programme of all the schools, ranking with,

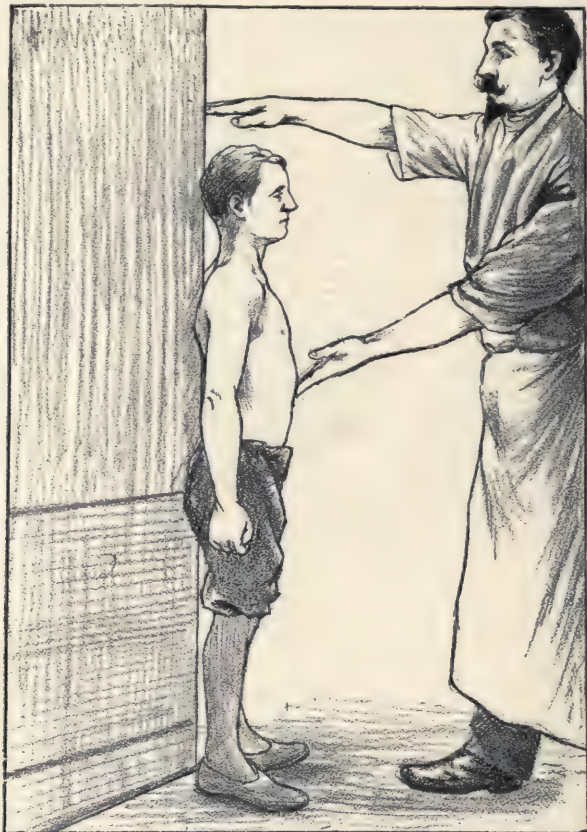


Fig. 616.

and of more utility than, lessons in astronomy, anatomy, chemistry, or physics.

But besides these eight or ten minutes devoted specially to respiratory movements, it is necessary that the child profit by

the lesson without intermission. For all the *remainder of the gymnastic exercises* he ought to breathe deeply, taking care that in each exercise the end of inspiration coincides with the maximum of effort, and that, *during the whole day* he should remember to make several forced respirations every hour, which will insensibly lead to better respiration at ordinary times, even when he is not thinking of it.

After the eight to ten minutes devoted to the respiratory movements a *rest of five minutes*, in the recumbent position, on the floor; then one passes to the second part of the lesson.

2ND PART.—**Active exercises**, made by the child alone under your direction.

(A) AUTO-STRAIGHTENING.—1st. *Exercise*: The child, his arms hanging downwards, his back supported at the edge of a door, tries to make himself taller, without raising himself on his toes, raising his shoulders, or lifting up his chin (fig. 616) as one instinctively stretches oneself under the standard to push the slide with the head. He is able in this way to increase his height by 1, 2, 3 centimetres, from the beginning of the exercise.

2nd. To obtain still more by this exercise, he places his hands upon his hips (thumbs behind) using them as a support and raises himself on his arms, always without raising the shoulders (fig. 617).

After having repeated these exercises for six minutes, he rests for two minutes, and passes on to the following:—

(B) CORRECTION.—This exercise lasts from four to five minutes.

1st. The child, arms down, inclines himself to the right, on the side of the convexity, the shoulders remaining in the same plane, transverse vertical, or frontal (fig. 618).

By this movement, the right curvature will be placed in a state of hyper-correction, and you may even see a curvature produced in the left side. There may be, as it were, a scoliosis in the opposite direction.

2nd. The child holds his left arm (concave side) straightened vertically; he stretches himself as far as he can (fig. 619), whilst, with his right arm semi-flexed, he pushes forcibly the right convex side from behind forwards and from without inwards. He repeats Nos. 1 and 2 for four minutes.



D. Touchon

Fig. 617.



S. J. F.

Fig. 618.



S. J. F.

Fig. 619.

After that, five minutes' pause as above. Then, we pass on to the third part of the exercise.

3RD PART.—**Passive Exercises.**—Here, the surgeon (and later the mother) straightens the deviation. The child submits passively to correction.

1st. He is laid on the right side, that is, on the convex

side ; a pillow is doubled up and placed between him and the floor (duration, two minutes : fig. 620).

2nd. You join your hands under the convexity and raise



Fig. 620.

him from ten to fifteen centimetres above the folded pillow. Repeat this from six to eight times a minute (fig. 621).

3rd. The child is hung up by the hands to a bar fixed in a doorway, the feet off the ground ; you take him by the pelvis



Fig. 621.

which you displace towards the right (convex side) from 30 to 50 centimetres. The right curvature will be corrected. Repeat this five times, taking, after each movement, a few seconds' rest (fig. 622). Afterwards, *five minutes' pause as above.*

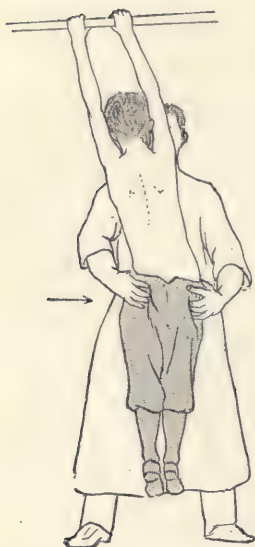


Fig. 622.—Scoliosis with convexity to the right (single curvature). The child being suspended on the horizontal bar, one carries the pelvis to the right.

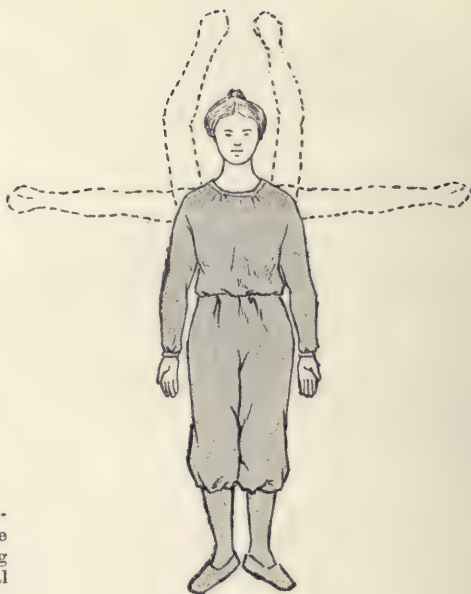


Fig. 623.



Fig. 627.



Fig. 628.

4TH PART.—You complete the treatment by some **General Exercises**, symmetrical, regular, and **slow**.

Standing Upright.—1st. Elevation of the arms in all directions, in two or four stages (fig. 623).

Remember that the movements of forced inspiration ought

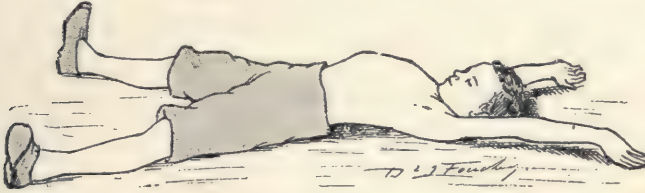


Fig. 629.

to coincide with the elevation of the arms, and the movements of expiration with their depression.

2nd. Movements of lateral inclination, of flexion forwards, of rotation of the head in two stages.



Fig. 630.

3rd. Flexion of the thighs (fig. 627 and 628). Repeat Nos. 1, 2 and 3 for two or three minutes.

Lying Down.—1st. The arms are carried outwards, then above the head, without leaving the floor, then returning them to their first position (fig. 629).

2nd. The lower limbs are widely separated, then approximated.

3rd. The legs are flexed on the thighs, the thighs on the pelvis, the pelvis on the thorax (fig. 630).

Then repeat Nos. 1, 2 and 3 for one or two minutes.

Laid on the Face.—Raise the trunk, make swimming movements. Some one supports the feet, at the beginning (one minute) (fig. 631).

Massage of the Back.—Before leaving the child you perform massage of the back; first, skimming over it from the head downwards; then firm frictions with the palm of the hand, from below upwards; afterwards **vibrations** with the index



Fig. 631.

and second fingers together, on both sides of the spinous processes, one hand on the right, the other on the left.

Scoliosis is an arc of a circle. On the concave side, all the tissues, muscles, tendons, ligaments, aponeuroses, are contracted. Therefore, on the concave side stroke, knead, extend, stretch the muscles, as you would do for the contracted adductor in coxitis.

On the other side, on the contrary, the muscles are feeble, ill nourished: one must strengthen them, preserve and improve their nutrition. Reserve for these muscles a slight massage, slow and rather prolonged (10 minutes), causing the lymph and the blood to circulate, hastening, by an incessant return of new

blood and a vigorous circulation, the nutritive and respiratory exchanges.

The application of **electricity** in the form of constant and faradic currents will render you very great service in hastening the regeneration of the muscles and increasing their force.¹

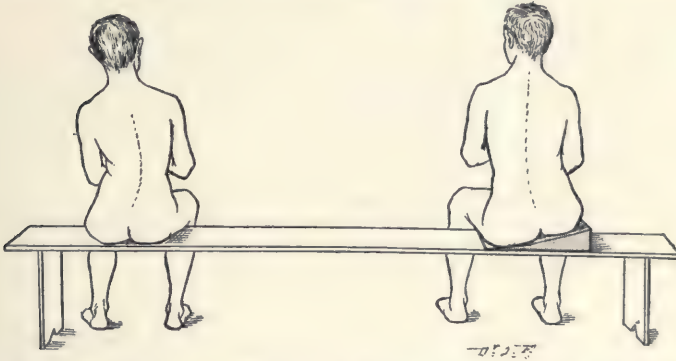


Fig. 632.—Special form : to the left (of the reader) the scoliotic child is badly seated ; on the right, the seat is oblique, raised on the convex side : the child, to keep his equilibrium, straightens himself instinctively.

This is what you can do and know how to do wherever you are : something which a devoted and intelligent mother will do when she has once seen it done.

¹ **Electrisation** of the muscles of the back, in Scoliosis, is performed at a **séance** composed of **two parts**: the **first** devoted to the **galvanisation** of the muscles of the **convex** side whose increase of vitality is necessary ; two large electrodes are used, one at the nape of the neck, the other at the loins ; the positive pole is at the nape of the neck. The current is turned on and gradually increased up to 15 milliamperes : it is applied for 10 minutes.

The **second part** is devoted to the **rhythmic faradisation** (Bergonié) of the different muscles of the back. It is of advantage to electrise the muscles of **both sides**. Faradisation is used in the form of induced current obtained from a coil with a large thread. The necessary interruptions to excite the successive contractions of the muscles are determined by the operator with his finger, or, better, by a metronome interruptor introduced into the circuit (the apparatus is regulated so as to obtain medium contractions with an interval of a second's rest). The second part of the séance should last about a quarter of an hour (Dr. Bergugnat, d'Argelès-Gazost). The electrical séances should be repeated three times a week for two months, after which one discontinues them for six or eight weeks. For installation of the apparatus, see chapter on Infantile Paralysis.

In the afternoon a second séance of gymnastics and straightening, in every way the same as that of the morning.

In the interval, three or four times a day, a quarter of an hour's walk. No violent games, no cycling, no fencing, no swimming.

Between times, at meals, for instance, and while learning his lessons, the child should be seated on an inclined seat as shown here (fig. 632).

As to school, as I said before, if the child is to attend it, the special desk is necessary (fig. 609), two hours' **class** in the morning, with a quarter of an hour for recreation, and two hours' **class** in the evening, are **permitted**.

Finally, it is well to ensure for the child an hour or an hour and a half rest, now on the back, quite flat, then laid on his side, with a folded pillow interposed between the floor and the convexity.

We have already mentioned his sleeping at night on a flat bed.

THE CORSET IN SCOLIOSIS

Is it necessary to wear an orthopædic corset ?

I warn you that every family, or nearly every family, will cavil with you as to the utility of a corset in this first stage of Scoliosis, where, say the parents, there "is absolutely nothing wrong."

It is true that the corset may not be indispensable at this moment, for a child who is almost always reclining.

We cannot reasonably insist on it at the beginning ; it would be too harsh a proceeding to remove the child from the ordinary life of children of his own age. The family would not be agreeable to it, and it would not be agreeable to ourselves were we dealing with our own children. We therefore allow the child to continue his studies, and at the same time give him liberty to come and go to the séances of exercises and massage. But to allow this liberty to walk and remain upright for several hours a day is not without disadvantage ; it is better to support the vertebral column with a corset. I do not say that the disease will never be cured without a corset in Scoliosis in its earliest stage : nevertheless, even in mild cases, there will be **a much better chance of a good and rapid cure with a corset than without it.**

To judge of the expediency of a supporting corset, think of club-foot. If, after having redressed it by manipulations two or three times a day, the patient is made to walk without a support, what will become of him? Not only will there be no correction, but, as a general rule, the condition will become aggravated, so one is obliged to support the foot in the intervals of the exercises. Well, the situation is just the same here.

Therefore, bear in mind that the manœuvres and exercises of redressment in Scoliosis are not carried out in many families more than once every two or three days. If, from one séance to the next, the spine is not well supported, the scoliosis will easily become aggravated.

But it is not sufficient "to put on" a corset; it is necessary that it serve its purpose well. **In practice, nearly all the corsets are defective;** they do not support, and they prevent nothing, or next to nothing; the back, instead of being eased, is made to carry increased weights; it is a burden which, added to the already too great pressure of the head and shoulders, only accentuates the deviation instead of lessening it.

Look at the corsets generally used: whether intended for a Scoliosis situated high or low, the corset invariably stops at the axilla, often manifestly leaving the deviation outside the upper edge of the corset. On the other hand, the corset does not descend low enough; it terminates at the iliac crests. So that, if one could see through the corsets in common use (you could try to do so: make a dorsal opening, to convince yourself of what I say) one would see the deviation as it is under the corset, sometimes even accentuated by the weight of the apparatus.

How is this difficulty to be solved?

The best method of supporting the spine would be to make use of a movable plaster corset, similar to that used in Pott's disease, see Chap. V., a medium plaster, or a plaster according to the situation of the scoliosis. It should be constructed in the position of correction of the scoliotic spine, with an opening in the back in order to be able to exercise direct and precise pressure on the convexity.

And this is the kind of apparatus we advise you to adopt for hospital children, where arrangements do not permit of

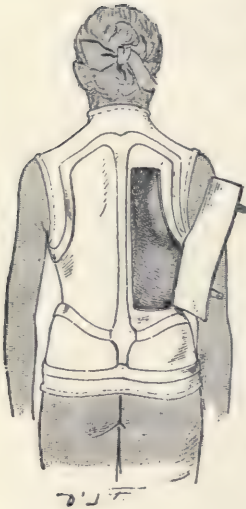


Fig. 633.—Corset with an opening to compress the convex side.

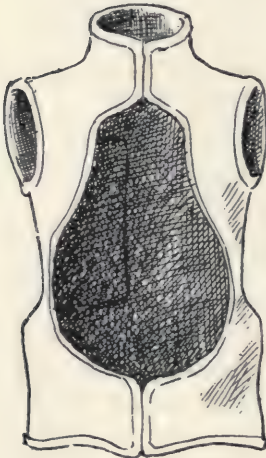


Fig. 634.—The same; front view.

their attending the séances of gymnastics and redressment.

But there is something better for private cases which you (or the parents) can attend to, exercise and straighten once or twice a day.

In these cases, in order to meet every requirement, namely, the support of the back and the carrying out the daily exercises, apply a **movable corset**, a medium one with officer's collar in leather or celluloid. Choose the latter, which is at once **lighter** and **firmer** (fig. 633 and 634).

You take a mould in very slight extension of the spine (the feet resting on the ground on their entire length, and on this mould you construct, or cause to be constructed by the orthopædist, a celluloid apparatus.

We have described, on p. 93, the method of making a mould of the trunk and an apparatus in celluloid, as well as the technique of dorsal compression.

Ought the corset to be worn always?

In theory, it would be excellent to keep it on constantly, omitting it, of course, at the séances for straightening.

As a matter of fact, it would be better, in order to spare the muscles, for the parents to remove it at night and also, if practicable, during the hours of rest (in the recumbent position) taken during the daytime.

II.—SCOLIOSIS OF THE SECOND DEGREE

If a more advanced scoliosis is brought to you with already two curvatures (for instance, a dorsal convexity to the right and a lumbar convexity to the left, that is, a *scoliosis of the second degree*, see fig. 607), you can and you ought to treat it. With a treatment longer and more exacting, you will not only stop the actual deviation, but even obliterate it almost completely.

Nevertheless, do not be positive in such a case, for a perfect result is not certain if the patient has come to you rather late.

General Treatment

You will prescribe the same dietary, the same hygiene, the same respiratory exercises and general gymnastics as for a case in the first degree, but the manner of life of the child will not be exactly that already described.

Several things which were permitted in early scoliosis should be proscribed in this stage.

In order to carry out a consistent treatment, it is necessary to withdraw children from school for at least a year. Piano playing must be discontinued, and, it goes without saying, horse riding, cycling, as well as violent games and long walks, are forbidden.

The girl, withdrawn from school, would, however, be able to continue her studies, either sitting on a special form or, still better, lying on her face or her back.

She must rest, at any rate, for 4 or 5 hours every day, in the recumbent position.

One cannot, generally, insist upon continual recumbency, as some would do. It would be too great a strain on the habit of life of the child, as well as upon her friends. Her general health would suffer, unless she lived by the sea, which is not possible for all, or, at least, for the majority of children.

Therefore you will permit some amount of walking; 3 or 4 times a day, for a quarter of an hour or twenty minutes at

a time. These moderate walks will have the effect of preserving the general tone of the muscular system.



Fig. 635.—Corset with two openings, one over the dorsal convexity, the other over the lumbar convexity, allowing of compression being made as with the corset shown in fig. 642, p. 596.

Local Treatment

A.—**The Corset.**—There need be no hesitation about using a corset here; it is always necessary. It should be a celluloid corset, with two openings opposite the summits of the two curvatures, to effect the two compressions in opposite directions (fig. 635).

During the day it is only removed for straightening exercises and during the hours of rest on the back. It remains in place at night also (at least, one night out of three, to preserve the correction without fatiguing the muscles too much).

B.—We come now to the **straightening exercises** to be carried out in Scoliosis of the second degree.

1st. **AUTO-STRAIGHTENING.**—(a) Begin with the corrective exercise advised for the first degree (see fig. 616).

(b) The same, the hands on the hips (fig. 617).

(c) Advise also the attitude shown in fig. 637.

The child, upright on a stool, stands on the left leg, the right leg hanging over outside. The lumbar curvature is then corrected (fig. 636).

He raises his left arm on the side of the dorsal concavity. The dorsal curvature is corrected (fig. 637).

He pushes with the right hand over the right concavity. The dorsal curvature is hyper-corrected.

2nd. **ACTIVE EXERCISES OF CORRECTION.**—(a) The same

exercise of lateral flexion as in fig. 618, the left foot resting on the footstool.



Fig. 636.



Fig. 637.

(b) The legs in the same position, the child draws up his left arm, as in fig. 619,

3rd. PASSIVE EXERCISES.—(a) The child is laid on his right

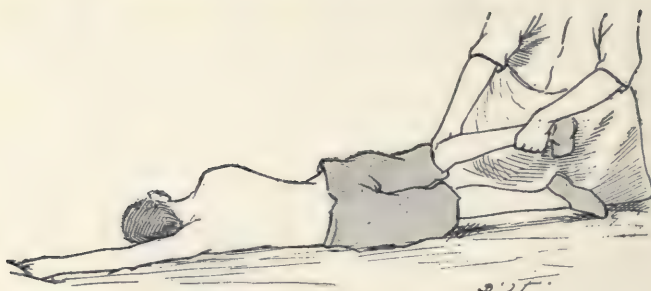


Fig. 638.



Fig. 639.

side. The dorsal convexity is raised up and corrected by a folded pillow, just as in fig. 620.

(b) The child is lifted up by that part of the body opposite the dorsal convexity as before (fig. 621). But, besides that, you pull on the right leg, on the side of the lumbar concavity, and that straightens the concavity.

(c) The child is laid on his left side, and the left arm (on the side of the dorsal concavity) stretched as much as possible ;



Fig. 640.—Straightening of a scoliosis : the child is laid on his side, a pillow placed under the convexity : the surgeon presses upon the pelvis and upon the shoulder to straighten the vertebral column.

you pull on the right leg, on the side of the lumbar concavity, and this manœuvre (fig. 622) straightens both the curvatures.

(d) The child holds by his hands to a bar fixed between two doorposts, the bar being inclined in such a way that the right hand (on the side of the dorsal convexity) is lower than the left (fig. 639).

Then the legs are carried to the left and the pelvis is brought down a little to the right.

(e) The child will place himself, several times during the

day, in the recumbent position, on the left side, and will perform flexions of the right leg.

Forcible Straightening and Treatment by the Plaster

Can anything more be done for these scolioses of the second

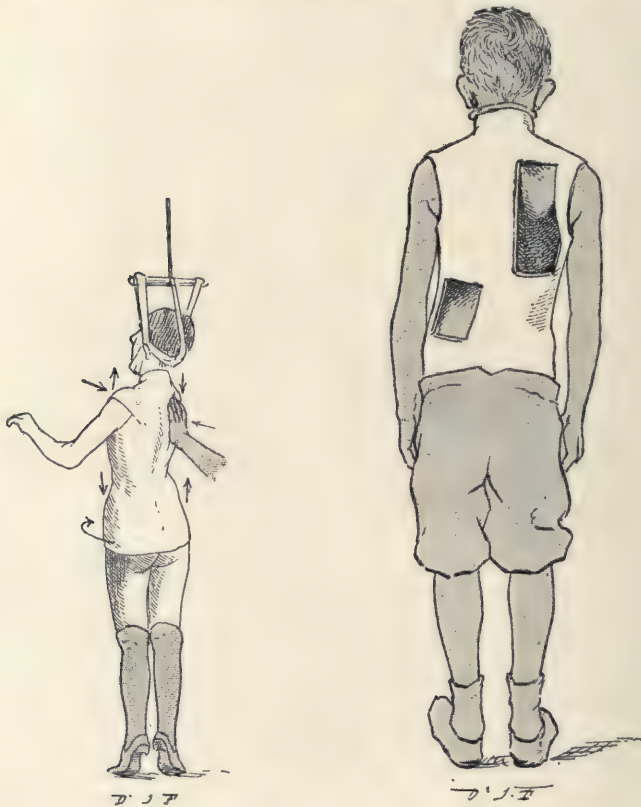


Fig. 641

Fig. 642.

Fig. 641.—Scoliosis with convexity to the right. The plaster in process of drying. One pushes the right shoulder forward and the left backwards. One pushes backwards and upwards the right hip. One pushes forwards and downwards the left hip.

Fig. 642.—The apparatus completed and furnished with two openings opposite the two convexities (right dorsal and left lumbar).

degree? For instance, can we seek for a more accentuated

passive straightening, and maintain the result obtained with an irremovable plaster ?

Yes, without doubt, but for a very limited time and only after

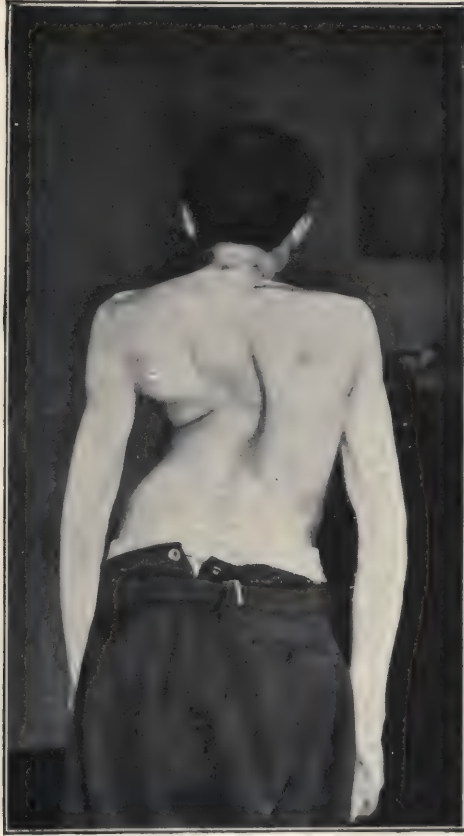


Fig. 643.—A case of forcible redressment. Scoliosis of the third degree, of eight years' standing. Albert G., of Paris, 19 years and a half. Condition on arrival at Bercé in 1903. Height, 1·57 metres. The following figure shows the result.

having well mobilised the vertebral articulations and strengthened the muscles of the back by the treatment we have just described, continued for six months, for example.

Then you may make a more accentuated passive straightening

of five or ten minutes, the patient laid on his side—by manœuvres analogous to those which one would make for straightening any



Fig. 644.—The same six years later. Height, 1·66 metres. The treatment had lasted two and a half years and consisted in the application of a new large plaster every three or four months; he had seven plaster apparatus, of which the two first were applied under chloroform.

deviation whatever, a club foot, for example, and going as far as hyper-correction (fig. 640).

Immediately this is reached, one applies, in the upright position, a very accurate medium plaster (fig. 641 and 642), with

dorsal and lateral openings (see as to the construction of the corset, p. 289). The plaster will be kept on for several months, about three or four, after which one removes it to repeat the ordinary treatment with gymnastics and a removable corset in celluloid made on a new mould. This method keeps the muscles of the back in condition much better than that which consists in carrying out the whole of the treatment with a plaster.

Nevertheless, this last treatment is the one you would be obliged to apply to hospital children and to those of the working class, to whom the daily treatment by gymnastics is not possible.

True! the complete treatment of scoliosis by plaster will generally give the best immediate results; but the muscles having been enfeebled by the pressure of the plaster and the want of exercise and massage, the result is often lost, in part, after the removal of the plaster apparatus.

So that, in private cases, it is necessary to try to effect the straightening of the osteo-articular column at the same time that you preserve the muscles. That is what you will succeed in doing by the combined method, gymnastics and celluloid corsets, as we have described it.

SCOLIOSIS OF THE THIRD DEGREE

We have defined this at the beginning of the chapter. There can be no question of classes or studies to be kept up by the children; they are patients whose treatment should be as continuous and strict as *that of Pott's disease*.

They should live by the sea if possible.

After having mobilised the more or less ankylosed vertebral articulations by gymnastic treatment kept up for several months, one will submit them every three months to séances of forcible straightening, 15 or 20 minutes at a time, under chloroform, followed by the application of a large plaster with dorsal openings for the compression of the projecting parts.¹ Rest for one or

¹ Vide Calot, *De la correction des Scolioses graves* (Masson).

two years in the recumbent position (fig. 643, 644). Our object is limited, here, to fixing the back in a better position, without immediately concerning ourselves with the muscles.

This treatment is very difficult and very thankless, *on account of the excessive torsion of the vertebræ* in such cases, a torsion against which we are very badly provided, in spite of all the "detorsion apparatus" that have been invented up to now.

But, as I have said, the treatment is exclusively reserved for specialists, and I will not labour the point.

RÉSUMÉ OF THE TREATMENT OF SCOLIOSIS

This is what you will prescribe for the young scoliotic girl who has come to you *at the beginning of the disease*.

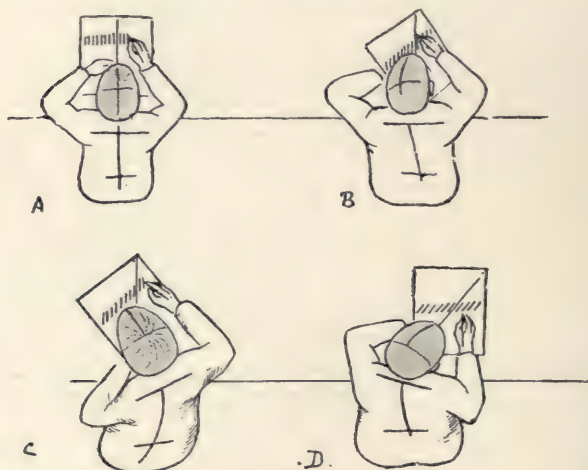


Fig. 645.—A. The handwriting straight (characters straight) leaves the spine straight.

B., C., D. All the other handwritings carry with them the vicious attitudes of the spine (lateral inclination and torsion).

(Copied from Ritzmann and W. Schulthess, of Zurich.)

Should there be adenoids, troubles of vision, deformity of the lower limbs, they must be attended to.

1st. General Treatment.

(a) Dietary sound and simple, supervision of the digestive functions, massage of the abdomen.

(b) General Hygiene : life in the open air of the country or of the seaside, salt baths, good conditions of climate and of dwelling, as a matter of course.

2nd. Local Treatment.

(a) Ensure a good posture in school (see fig. 645).

(b) General and special gymnastics : three-quarters of an hour morning and evening (active redressment, passive redressment). Instruct the mother how to carry out the exercises.

(c) Massage and electrification of the muscles of the back.

(d) A fenestrated corset and compression, except in scoliosis almost imperceptible at the beginning.

It is sufficient, after having "started the treatment," to see the child once or twice a month, in order to control it, and to take a mould once a year when necessary to renew the corset.

If you treat commencing Scoliosis in this way in your clientèle, I do not say that there will be no more severe cases,¹ but I affirm that they will be a hundred times less frequent, as is the case in Sweden, where they are practically never to be seen.

The Duration of Treatment of a Recent Scoliosis.

You will carry out the treatment we have described, as long as the scoliosis continues, that is, **for from one to two years, as a general rule, for scoliosis of the first degree**—those you are mostly called upon to attend.

After that, your active part will practically come to an end ;

¹ Because there may exist, as we have said, some very rare acute scolioses, which may become aggravated *in spite of everything*, in the same way that some acute external tuberculoses do. But it is the greatest exception under any circumstance ; it does not happen more than once in a hundred times. I am speaking always of the essential scoliosis of adolescence, and not of scolioses distinctly and frankly rachitic, existing from the earliest infancy, the prognosis of which is much more serious.

you will be able either to discontinue the treatment, or reduce it by half, leaving the parents or the children to continue it themselves to the extent you judge to be necessary. They will do so without difficulty. Nevertheless, you will have to look after these young girls for several years, and even up to the end of their development, stopping the active treatment and returning to it, according to the needs and indications in each particular case.¹

¹ For an account of the Abbott method, see my brochure on "Abbott's Method and Scoliosis," published by Maloine.

CHAPTER IX

KYPHOSIS AND LORDOSIS

NEXT to the lateral deviations we must mention the *median* deviations (non-tuberculous) which cause :—

Either the *round back*, *kyphosis*, that is to say, a posterior convexity (fig. 646) ;

Or, on the contrary, a *saddle-shaped hollow*, a *lordosis*, that is, a deviation with a posterior concavity (fig. 647) ;

Very often round back and lordosis exist together. The patient presents a *dorsal kyphosis* at the level of the shoulder blades and a *lumbar lordosis*, which is simply an exaggeration of the physiological curvature of the loins.

Kyphosis (round back) and *lordosis* may exist without any other deviation : but they may also be added to a lateral scoliotic deviation.

One may even say that, generally, Scoliosis is accompanied by a deviation slightly or strongly marked in the antero-posterior direction (kyphosis or lordosis), or even a flat back.

Therefore always remember to carefully examine the spine and look for a scoliosis when you are consulted as to a round back, just as a suspicious lumbar hollow invites you naturally to examine the gait and condition of the hip and to think of a congenital luxation or a coxitis.

The same treatment and the same exercises are suitable for kyphosis and lordosis, whether they exist alone or are associated with a scoliosis.



Fig. 646.

Kyphosis or Round Back¹*A. Respiratory Exercises.*

Fig. 647.

Position at the start.—The child's arms are extended and brought together in front, the hands being in contact.

¹ You know well enough the profiles of those spare young people, and especially young girls, with arched backs and round shoulders, their scapulæ separated and projecting like wings (instead of resting closely on the thorax), their chests misshapen and their necks bent forward, giving to their walking a characteristic gait. The round back is the index of a general weakness of the organism. Here, what is imperative, in addition to the local treatment necessary, is a general tonic treatment. Seaside treatment works marvels with such children.

The child then takes a deep inspiration, separating the arms at the same time. An assistant makes resistance to the move-

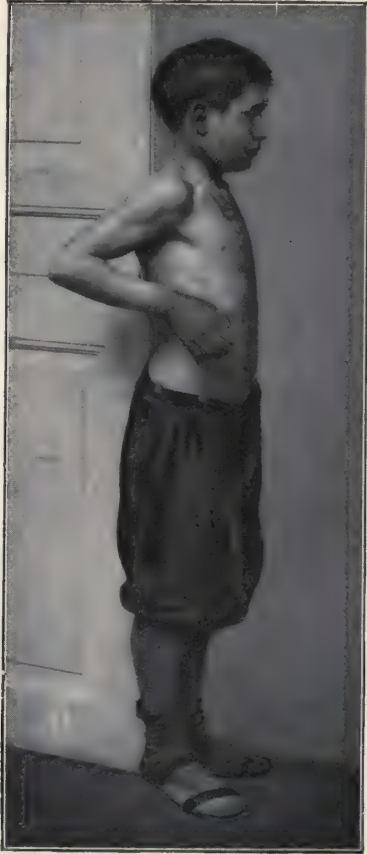


Fig. 648.

ment of separation of the arms—a gentle, equal, and sustained resistance.

This exercise develops the muscles which approximate the scapulæ to the vertebral column.

B. Active Exercises.

1st. The child extends the head backwards, at the same time that he curves the loins.



Fig. 649.



Fig. 650.

Fig. 649.—Round Back. The child hangs upon an upright ladder with a cushion beneath her shoulders.

Fig. 650.—The child is seated at the foot of a straight ladder, the arms are raised, the thighs in forced flexion, the knees flexed on the thighs and kept so by a strap.

2nd. Standing upright against the edge of a door, he carries his elbows as far backward as he is able (fig. 648).

C. Passive Exercises.

The child is placed against a ladder, suspended by the arms. A cushion is placed behind the shoulders, opposite the deviation (fig. 649).

In school, the child, as much as possible, keeps his arms crossed behind the back of his chair.

Sometimes the wearing of braces, which draw the shoulders backwards, may be recommended on the condition that they do not impede the respiratory movements.

The other points of treatment of essential Kyphosis—diet, hygiene, shortened school hours, walking and promenading, recumbency, etc., are the same as for Scoliosis of the first degree (see p. 570).

The Corset.—In preference to the braces mentioned above, the child may wear, except during the night, and, of course, at the time of the gymnastic exercises, a celluloid corset with **a median dorsal opening** to allow of **compression by cotton wool**, which will help the correction of the Kyphosis.

We have completely cured, by plaster or celluloid corsets alone, and without other treatment, a great number of round backs and lordoses (with, of course, the precious adjuvant of sojourn by the sea). But the best course is to combine the two therapeutic factors—gymnastics and a corset.

Lordosis

Active Exercises (see fig. 648).

Passive Exercises (see figs. 649 and 650).

Correction of the lumbar hollow by the recumbent position face downwards, with weights on the buttocks and the back.

Note also the good effects of extension of the spine by suspension, or, rather, simple tension (see fig. 243 and 244); repeat such tension of the spine three times a day, five minutes each time.

The corset is the same as that for Kyphosis: by pressing on the dorsal region through an opening there, one lessens much the "hollow" of the lumbar Lordosis.

CHAPTER X

RICKETS

WE concern ourselves here with Rickets from the orthopædic point of view only.

Rickets deform particularly the lower limbs and the back.

I.—DEFORMITIES OF THE LOWER LIMBS

They are, in order of frequency :

(a) Deformities of the knee in particular, genu valgum ; much more rarely, genu varum ;

(b) *Curvatures of the tibiæ ;*

(c) *Curvatures of the femur and coxa vara.*

A.—Genu Valgum

A little child of from 2 to 4 years of age is brought to you with a knee, or, more often, both knees, bent inwards ; what are you going to do ?

You can adopt a general treatment and a local treatment.

The general treatment of Rickets, as you know quite well, is :

Medical.—Cod liver oil, phosphates, etc., with the discreet use of intestinal antiseptics ;

Dietetic.—Milk and eggs constitute the basis of the feeding.

Hygienic and Climatic.—Living in a house and in a climate which are dry and sunny and, if possible, at the seaside, which works marvels in such cases, and cures the children with a minimum of local treatment.

Local Treatment.

The first thing is to prevent walking, if you can induce the parents to see to this ; rest in the sitting position, the legs horizontal (for some months, from 6 to 10 months, or thereabouts).

At the seaside, rest suffices to bring about the straightening of nearly all rachitic deformities not far advanced.

At Berck, for example, it has been so in more than three-quarters of the cases which have come to us. After a stay of from 6 to 15 months, the knees have become straight and strong spontaneously. One can then let the children get about ; they are cured and remain cured, without ever having worn an apparatus.

But matters do not go so simply with children who live under conditions less favourable, for example, in a large town, nor even with those living at the seaside when the genu valgum is very marked as in the case illustrated, of three brothers attacked at the same time with serious rickets (fig. 657 and 658).

Therefore, in a poor neighbourhood, and in severe cases, you would be wrong in discounting the cure by rest only ; begin active treatment without loss of time.

On the other hand, if the parents do not agree to allow the child to rest, the use of an apparatus after correction is necessary, even in mild cases.

There are **two ways** of effecting **correction**, or rather two methods to remember, although the classical books point out several dozens.

The first, the ordinary and most simple way, is to straighten the limb by acting upon the joint ; a **non-surgical** procedure.

The second is that of operating upon the lower part of the femur by means of MacEwen's **osteotomy**.

Both methods are good ; how are you to make your choice ?

It is, first of all, an affair of temperament on the part of the surgeon.

If, instinctively, you prefer not to use the bistoury, or, still more, if the friends recoil at the idea of an osteotomy, remember that you can always effect a cure by orthopædic manœuvres, by accommodating yourself to circumstances in the most difficult cases, to the making of two or three séances and as many apparatus, and devoting three or four months to the treatment, which puts you after all to very slight inconvenience.

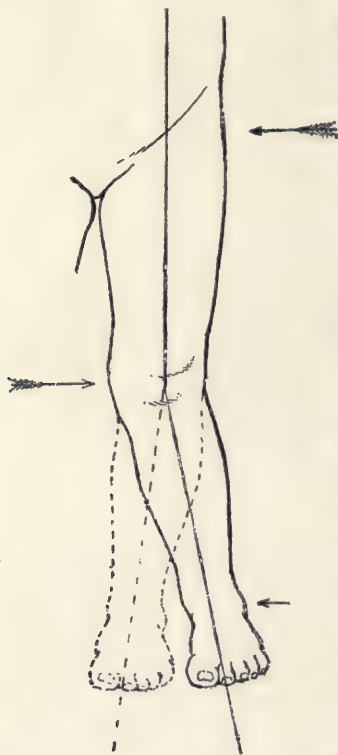


Fig. 651.—Schema of the correction of genu valgum.

On the contrary, if you are a surgeon, and consequently osteotomy is an operation familiar to you, you will willingly perform it, which is quite easy and will give you the desired result with a single apparatus and two months of treatment.

On principle, in spite of the good results of osteotomy, I advise you always to **prefer an orthopædic correction**, because the treatment is **more simple and more practicable** for you.

Need I add that, for other reasons, the purely orthopædic treatment appears to me more rational than the surgical, here, as in other deformities, club-foot, congenital luxation, etc.

Remain faithful to these principles. So far as I am concerned, I used often very willingly to perform the classical supra-condylar osteotomy, or even manual osteo-clasis; I adhere nowadays to a simple articular correction. I proceed in the following manner:—

1ST METHOD.—Simple Straightening

(a) The case of slightly marked genu valgum.

Be the joint loose or not, you will accomplish, by gentle progressive manœuvres of three, four or five minutes, a redressment more than sufficient for the knee. As soon as this result has been obtained, you fix the limb with a plaster reaching from the trochanter to the malleolus (see fig. 656). With this plaster apparatus the child is able to walk if the parents wish it.

The mean duration of the treatment is 5 or 6 months.

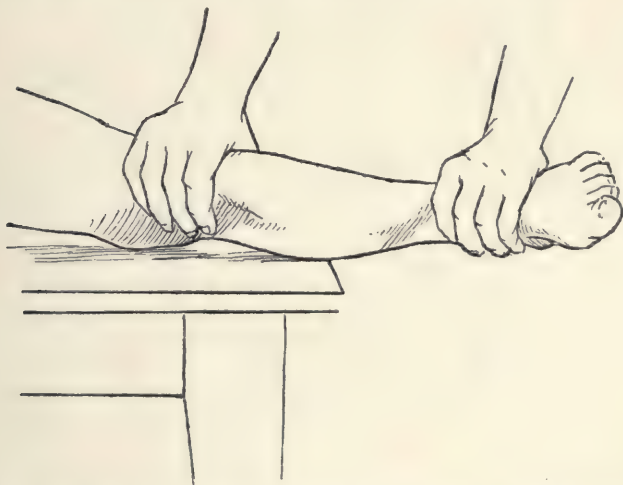


Fig. 652.—The foot is pushed inwards, and the knee is drawn outwards (see preceding figure).

Is it necessary for me to describe in detail the manœuvres to be made in order to arrive at the correction ?

It is evident that, since the femur and the tibia make a curve with its concavity outwards, our manipulations, our tractions, our pressure, will tend to open that curve, in acting on the two extremities (trochanter and malleoli) in order to push them back from without inwards, whilst an assistant's hand makes firm pressure in the opposite direction against the apex of the angle

which corresponds to the internal condyle of the femur (fig. 651 and 652).

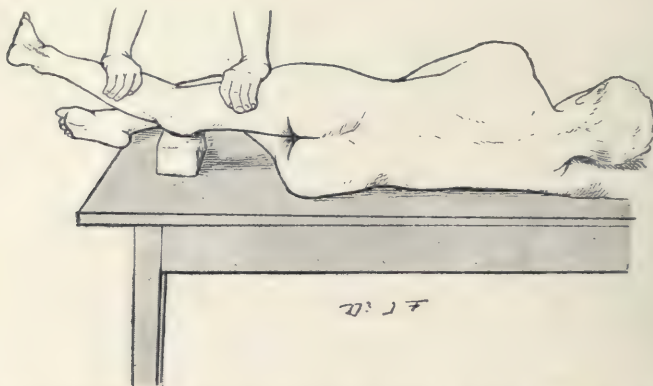


Fig. 653.—Correction of a genu valgum (the patient is laid on the sound side): the internal surface of the knee is placed on a block; one fixes the femur and presses on the foot and lower part of the leg, making rhythmical thrusts.

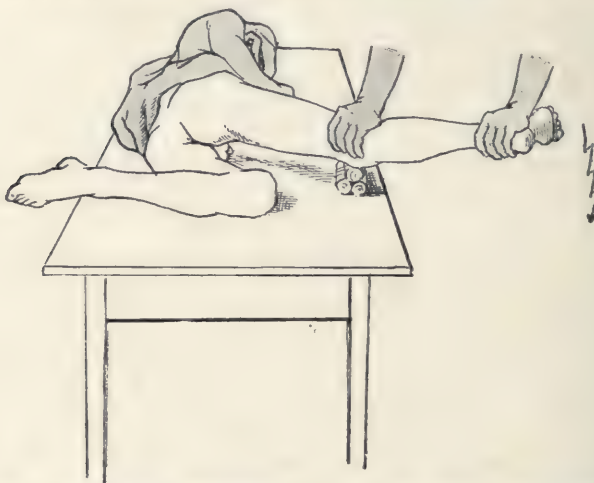


Fig. 654.—Genu valgum. Straightening. One rests the internal condyle on a firm cushion made of three bandages of muslin tied together.

During the straightening, the patient may remain laid on his back, but it is better to place him on the sound side of the trunk,

then to draw back the sound limb, in such a way that the internal surface of the affected limb, or, rather, of the internal condyle, rests upon an edge of the table covered with a serviette folded in eight. The thigh and the leg being kept in this position by an assistant, you yourself take the foot and move it upwards

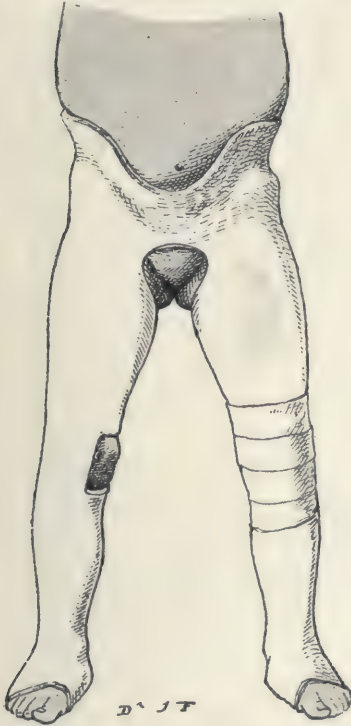


Fig. 655.—Double plaster apparatus, furnished with openings, to permit of compression with cotton wool over the internal condyle.



Fig. 656.—Plaster apparatus permitting walking, after the straightening is effected.

and downwards, little by little, until you have brought it down to the level of the table, and even below that level, in order to obtain a hyper-correction of from 15° to 20° (fig. 653 and 654).

It is necessary to take care, in these manipulations, to keep the leg in forced extension on the thigh (fig. 651 and following).

(b) **The case of a genu valgum very marked.**

It is here necessary to prolong the manipulations up to 10 or 15 minutes.

They will be made with or without chloroform, according to the pleasure of the surgeon ; one may dispense with chloroform,



Fig. 657.—Three children affected with double and severe genu valgum.

because, if the manipulations are made gently, progressively, methodically and slowly, they are not, or very rarely, painful. When the child is distressed, one desists, to renew them one or two minutes afterwards, or, even better, one is content, for the first sitting, with a partial correction.

However, I advise you, in a general way, to have recourse

to chloroform, because it facilitates the proceedings and enables you to obtain a complete result at once.



Fig. 658.—The same children, five months after simple orthopedic correction in three sittings, a large plaster afterwards.

GENU VARUM

In order to correct a **genu varum**, you will carry out manœuvres similar to the preceding, but in the opposite direction (fig. 659).

The correction or hyper-correction obtained, it is necessary to know how to maintain it intact ; so in order to maintain a correction of the knee, one ought to include the two adjacent articulations, that is, the ankle and the hip [with the pelvis] (see fig. 655, p. 613). When the last bandage has been applied, and **before the plaster sets**, one makes certain that the degree of correction previously obtained by the manipulations is maintained exactly, but no more ; because in one's desire to add something by pressure forcibly made through the plaster,



Fig. 659.—Genu varum. Straightening. The knee reposes at the external condyle upon a bandage of firm canvas, against which it is held by an assistant : the surgeon applies pressure on the foot by jerks to correct the deviation.

one runs the risk of causing a sore, particularly over the internal condyle.

If one has any reason to suspect a sore, or if the patient complains much at a point near the internal condyle, on the evening of, or the day after, the application of the plaster, it is well to make an opening opposite the spot, and replace the square of plaster by several squares of cotton wool which may be retained in position by a bandage, just as in compression of a curvature in Pott's disease (see Chap. V.). This precaution allows of one

preserving exactly the correction, without running any risk (fig. 655).

When there is a "double genu valgum," both knees are corrected at the same time, and a large plaster is used to fix both the lower limbs, with an abduction of the thighs of from 30° to 40° (fig. 655).

If the correction has not been completely made at the first sitting, one removes the plaster in a week or two, to complete it.

One makes a new correction, gentle and progressive, repeating the manipulations described above, followed by the application of a new plaster for a duration equal to the first, and so on, until one has obtained a correction not only sufficient, but more than sufficient, until one has transformed the genu valgum into a genu varum of from 15° to 20° .

For here, as elsewhere, it is necessary **to obtain too much in order to preserve enough.**

As soon as the hyper-correction has been obtained (in one or several sittings), one secures it with a plaster which is left on for two or three months.

After being thus fixed for about two months and a half, in hyper-correction, one may set the child free from all apparatus, but yet at repose in the sitting position for four or five weeks.

During this time, the cure becomes confirmed, the knee recovers its movements, and the muscles become stronger. To assist it, one massages and bathes the child, and one mobilises the knee carefully (two short sittings of one or two minutes every day).

After that, the child is made to get about with a knee-piece supporting the stiffened knee, a movable knee-piece in plaster or celluloid, reaching from the ischium to the malleoli, which one takes off after the hours of walking, but which must be worn for walking for two or three months.

In about six months from the commencement of the treatment, the cure is accomplished and the child has no longer any need for an apparatus.

You surmise that one would, if the friends requested it,

after the removal of the large plaster, place the child at once on his feet wearing the knee-piece, removing it at night, in order not to allow the knee-joint to become stiff.

On the other hand, as long as the large plaster is worn, the child remains at rest. Nevertheless, it may, if it is desired, walk with the aid of crutches.

If I mention this question of walking during active treatment, it is because it is nearly always raised by parents. You will find a good number who will refuse to agree to a treatment which creates an impossibility of walking, even when it is a question of a marked degree of genu varum.

If the parents will not listen to you either as to rest or as to crutches, this is how you would treat the case :

Treatment with a Plaster permitting Walking

You straighten the knees, at several sittings (without anaesthesia), bearing in mind what we have told you (p. 613). After each new slight correction, in place of a large apparatus taking in the pelvis, you will apply a plaster reaching from the groin to the malleoli, and leaving at liberty the adjacent articulations (see fig. 656) ; the child can walk with this apparatus.

You may thus arrive at a cure ; only it will take two or three times longer than the other method, each correction being maintained less perfectly.

For the same reason you may be asked to carry out :

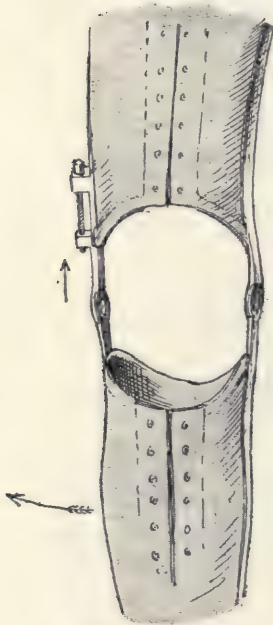


Fig. 660.—A movable apparatus with a screw which is turned slightly every two days to restore the straight position.

The Treatment with Orthopædic Apparatus for Walking

These apparatus for walking attract parents *à priori*. For my part, I do not advise you to use them, because they are very awkward to manage, too likely to get out of order, and

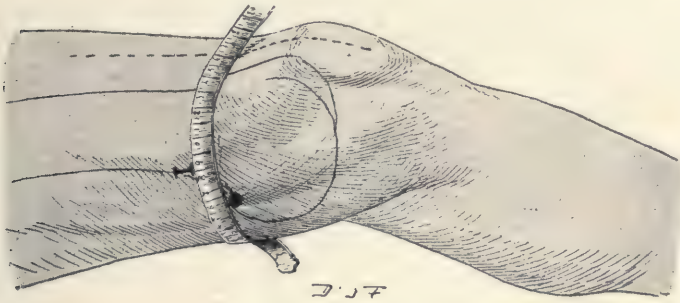


Fig. 661.—One makes an incision in the skin (above the prominence of the internal condyle) over a line *equidistant* from the anterior median line and the supero-internal margin of the popliteal space. (The black spot marks the adductor tubercle.)

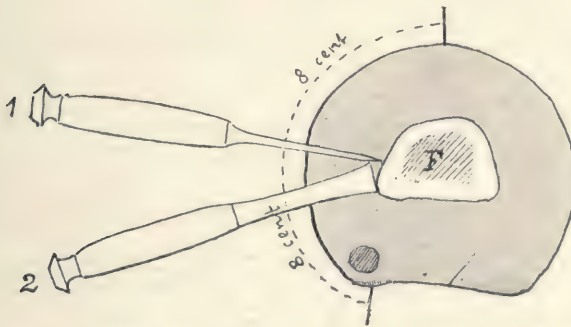


Fig. 662.—Schema showing the manner in which the osteotome reaches the femur (F). 1. The osteotome is pushed into the soft tissues, parallel to the axis of the wound, up to the bone. 2. It is afterwards turned round perpendicularly to the wound and the handle is carried backwards to attack the bone from behind forwards and within outwards.

because, after all, and in spite of appearances, they constitute **a less simple form of treatment** than the correction without chloroform made every eight days, followed by the application

of a plaster knee-piece. However, if the parents are obstinate and prefer an orthopædic apparatus, take a mould of the deformed limb and send it to the instrument maker; he will send you a rack-work apparatus, which the parents will adjust as directed every two days, and which will end, if it is well con-

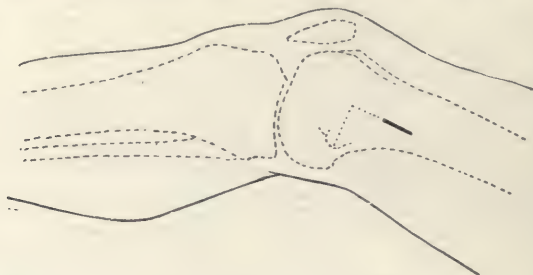


Fig. 663.—Place of election for the incision marked on the bone: two centimetres above and one centimetre in front of the adductor tubercle.

structed and well looked after, in bringing about a satisfactory redressment (fig. 660). But this method of procedure is certainly much longer and more unreliable than the use of successive plasters. It ought only to be an **exceptional treatment**, or **one of necessity**.

2ND METHOD.—**Supra-Condylar Osteotomy**

I do not make to osteotomy any other objection than that it is a cutting operation which one ought to avoid; one does

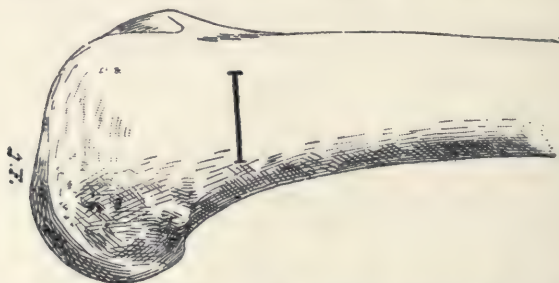


Fig. 664.—2nd stage. Then one turns the osteotome across the bone. Point where one ought to perform MacEwen's osteotomy.

not cure with it much more quickly than with simple straightening. It is true that it demands of the surgeon himself a little less time.

I reserve the operation, myself, for certain very obstinate cases of genu valgum in the adult, and even here one can obtain the correction by simple straightening; we will return to this in the special chapter devoted to genu valgum in adolescents.

In any case, osteotomy is an operation which you should know how to perform.

Technique of Supra-Condylar Osteotomy (fig. 665 to 668)

Instruments : bistoury, chisel and mallet.

In small children, of whom we are speaking exclusively here, the mallet is not always necessary in order to divide the

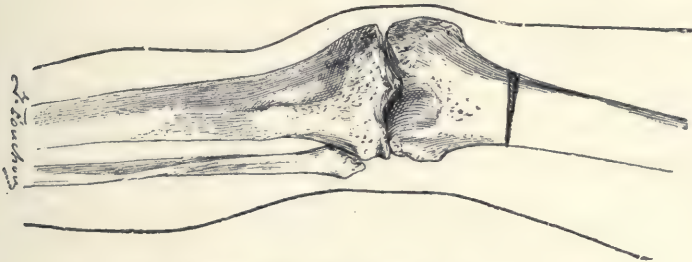


Fig. 665.—The section made.

bone; it is sufficient to drive home the osteotome with both hands. However, as the bone may be very resistant and even eburnated, you should always have a heavy mallet in reserve.

Have in addition a **cushion of moist sand** upon which the knee will rest on its external surface.

Position of the Knee : flexion, abduction and external rotation of 30° (fig. 666).

1st. **The Incision :** at 2 centimetres above the superior border of the internal condyle, and in front of the tubercle of the adductor magnus (the tendon of which is easily felt), you commence an incision 2 cm. in length, **ascending parallel**

to the axis of the thigh. The bistoury goes with one cut down to the bone and divides the periosteum.

2nd. One introduces the osteotome parallel to the axis of the limb, until

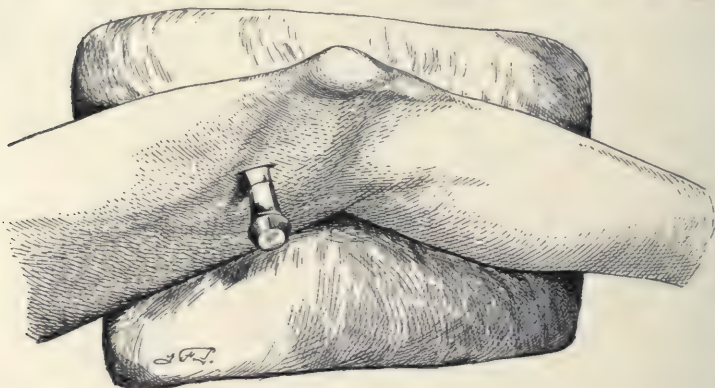


Fig. 666.—Introduction of the osteotome, its edge parallel to the axis of the limb.

one touches the bone, then one turns it transversely in a direction inwards and backwards, and (from 10° to 15°) from behind forwards; in this way, there is nothing to fear for the popliteal

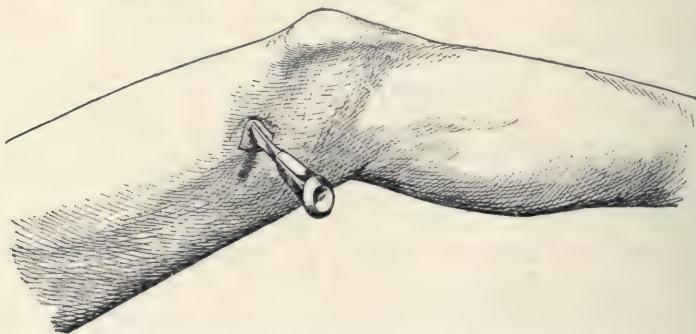


Fig. 667.—Arrived at the bone, the osteotome is turned round, the edge perpendicular to the axis of the femur.

vessels and nerve, from which the osteotome gets further and further away as it penetrates the bone. All that is possible to happen, at the worst, is to go through the skin on the external

side of the knee ; but that is not a serious inconvenience, with good asepsis.

If pressure with the hand is not sufficient to make the osteotome penetrate the osseous tissue, one can make it do so by a few sharp taps with the mallet, held firmly. One osteotome will generally be sufficient.

It is often necessary to give from 15 to 20 such taps to effect the division of the two-thirds or three-quarters of the thickness of the bone. One feels instinctively when one arrives there ; but it is well to have a graduated osteotome which records the degree of penetration.

3rd. One finishes with an **Osteoclasis**. It is better not to divide the bone completely. When the bone is cut to three-quarters of its thickness, one withdraws the osteotome, a dressing is placed over the small wound, and one endeavours to break the bone by manual force.

It is sufficient to press from within outwards on the lower fragment, by taking, in order to elongate the arms of the lever of the small fragment, the entire leg held in complete extension, or better, in hyper-extension. One presses firmly in this way (two or three times) until the bone gives way.

4th. One corrects the deviation, by making even a hyper-correction of from 15° to 20° . The genu valgum is thus changed into a slight genu varum.

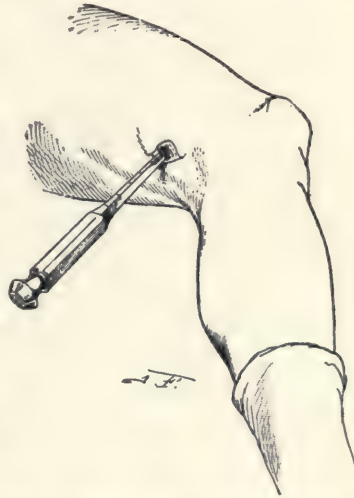


Fig. 668.—The osteotome ought to enter the femur from within out and rather from behind forwards : the osteotome is pushed by the hands (or, if the hands are not enough, by slight blows with the mallet) until the bone is divided to three-quarters its thickness. The instrument is then withdrawn and the resisting fibres of the bone give way to pressure exercised from within outwards upon the leg placed in hyper-extension.

5th. One applies a large plaster (see fig. 655).

This is removed on the fiftieth day. Then, the same procedure as before after simple straightening: the patient walks for two months with a movable knee-piece; massage and slight mobilisation of the knee.

Relapses.—You will not have any, neither after straightening nor after osteotomy, unless: first, you have been satisfied with an insufficient correction, or, second, you have left the child without an apparatus before the complete cure of the rachitic vice. It goes without saying, that whilst Rachitis is in progress you ought not to allow the child to walk, and especially to walk without a very good support.

B.—Rachitic Deformities of the Tibia

The deformities of the legs affect generally the lower third, and assume two principal forms: a curvature with an external convexity, and a curvature with an anterior convexity.

A good **general treatment**, a stay at the **seaside**, and

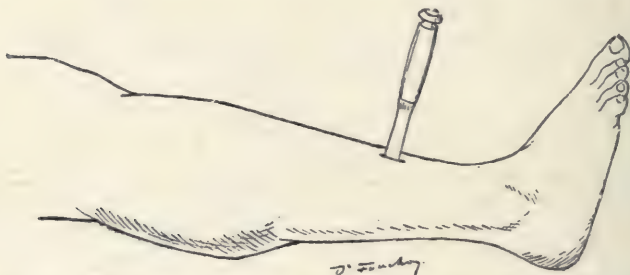


Fig. 669.—A vertical incision close to the external border of the tibia; the osteotome is introduced parallel to the wound (1st step).

rest, are sufficient to make slightly marked deviations of the *tibiæ* disappear.

How many children come to the seaside, whose distorted legs appear to justify an osteotomy, and who, without anything

having been done, return six months later, with legs straight, or fairly straight! That is nearly always the case.

If you are not able to send the child to the seaside, or if a stay at the seaside is not sufficient in some exceptional case, you will have to interfere actively; but it is understood that you will only do so if it is really necessary, when the deviation

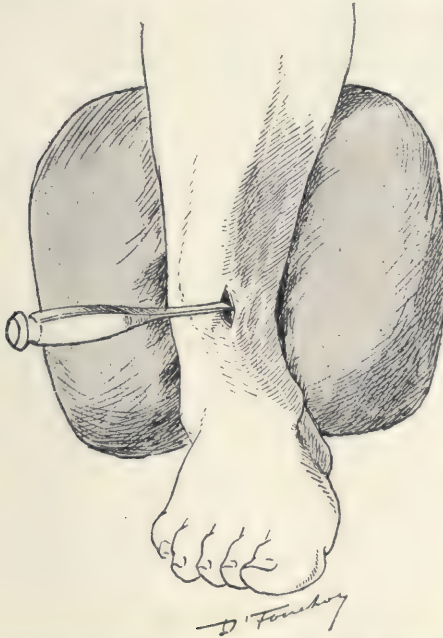


Fig. 670.—Osteotomy of the tibia (continued); the edge of the osteotome is turned perpendicularly to the wound and comes in contact with the tibia from without inwards.

is sufficient (an angle of more than 30° or 40° for instance) to render walking defective and produce a noticeable reduction in height, or where a line drawn from the middle of the patella to the anterior spine of the tibia and prolonged downwards, leaves the foot completely without or within it.

It is necessary then to make **a correction**. **How** will you do it?

1st. You will endeavour **to straighten the leg with your**



Fig. 671.—A radiograph after manual *osteoclasis* for rachitic deformity of the legs (in a child six years of age).

hands, bending it, like a soft iron rod, or a piece of green

wood. This is possible up to a certain age, say, from a year and a half to nearly three years ; sometimes up to four or five years. However, there is no fixed rule as to this ; it varies much with the children, the development of rickets being

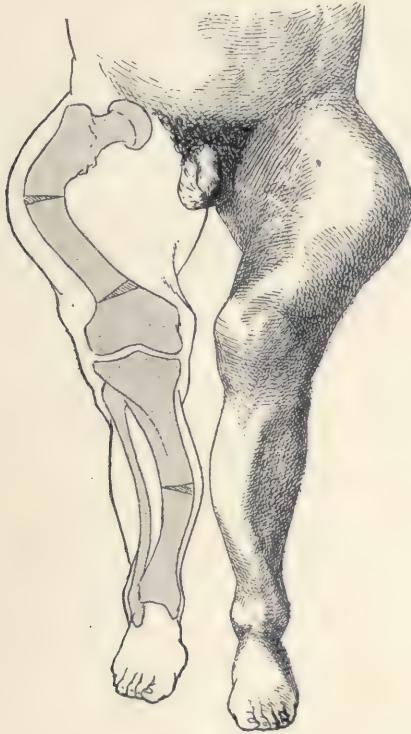


Fig. 672.—A case of severe multiple rachitic deformities of the lower limbs treated by a series of osteotomies. Here, the femur has been divided from without inwards. (The upper section.)

prolonged in some instances. You will attempt it nevertheless in **all cases**.

You proceed at first with gentleness : but, if in exercising a force of some kilogrammes, you do not succeed in making the bone bend, still continue ; use a force of from 30 to 40

kilogrammes (this varies, but I prefer to give you an idea of the effort to be employed), and then the bone **will bend**, or you **break it**, which will be a favourable solution (fig. 671), or the bone will refuse to yield.

If the bone still resists, perform an **osteotomy**, not on the same day, but a little later, when the contusion of the tissues has passed off.

The osteotomy should be **linear**, and not curvilinear or cuneiform, because the first is much **more simple** for you, and certainly **as effective** as the two others (fig. 671 and 672).

So as to be certain of avoiding all the important vessels and nerves, you enter from **without inwards**, from the external surface towards the internal surface of the tibia, contrary to what is said in books. You will support the limb afterwards with an ordinary plaster apparatus (see p. 613, fig. 655).

C.—Deformities of the Feet of Rachitic Origin

(RACHITIC FLAT FEET, ETC.)

The general treatment is the same as that given above, and the local treatment, that of ordinary club-foot (see Chap. XV) or of the flat foot of adolescents (see p. 651).

The correction is made at one, two or three sittings, then one proceeds to a veritable fashioning of the feet, which are supported with a permanent plaster for two, three, or four months, and afterwards with a small celluloid apparatus, which can be introduced into ordinary boots.

D.—Deviations of the Femur

In a general way, I recommend merely constitutional treatment and rest. It will probably never happen that you find yourself having to treat deviations of the femur so marked that a linear osteotomy may be necessary to secure a real benefit to the patient.

If it should, you will make a longitudinal incision 3 or 4 cm. in length on the antero-internal surface of the thigh, but *at two fingers' breadth outside the artery*, always easy to locate; then you will go by means of a *buttonhole*, between two fasciculi of the muscle, down to the bone. You can now introduce your osteotome on to the internal surface of the bone; then you turn it round transversely in order to push from within outwards (or from above downwards) towards the external aspect of the thigh, which has become the inferior. The parts are supported on a very firm cushion of damp sand (fig. 672).

E.—Coxa Vara

Coxa Vara.—Look at, in fig. 673, the normal direction of the neck in relation to the diaphysis. The neck forms with it an

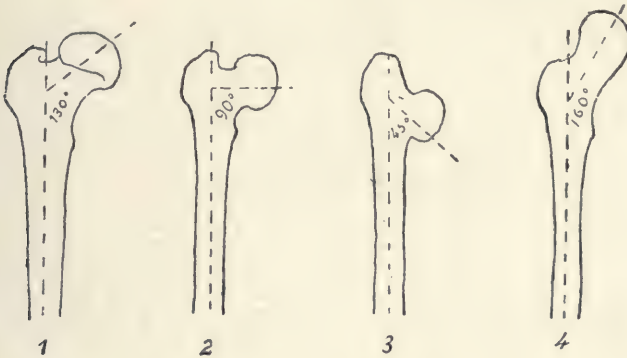


Fig. 673.

Fig. 674.

Fig. 675.

Fig. 676.

Fig. 673.—*Normal femur*. The axis of the neck makes with the axis of the diaphysis an angle (at the base) of about 130 degrees.

Fig. 674.—*Coxa vara* (medium degree). The angle of the neck with the diaphysis is a right angle.

Fig. 675.—*Coxa vara* of very severe type. The angle of the neck with the diaphysis is only 45 degrees.

Fig. 676.—*Coxa valga*. The angle of the neck with the diaphysis is of 160 degrees, instead of 130 degrees, the normal angle.

obtuse angle of 130°, that is, almost a right angle and a half. Coxa vara exists when the neck has become weakened until it

has become perpendicular to the diaphysis (fig. 674) and much more so when it makes an acute angle with it (fig. 675).

[On the contrary, if the neck is raised, making an angle much more than 140° (fig. 676), we have a **coxa valga** which is rather rare.]

I mention coxa vara here because it is nearly always of rachitic origin, in the same way that genu valgum is.¹

Similarly, coxa vara is observed either in children of two or three years of age, or in adolescents of from twelve to eighteen years. The two deformities are produced under analogous influences.

We are speaking here only of coxa vara in very young children.

It is because these children walk badly, **because they are lame**, that **they come** to consult you. And it is necessary to know that **this lameness** may be mistaken for that of **congenital luxation of the hip-joint**.

The diagnosis of coxa vara from congenital luxation of the hip. The child **swings** from side to side and **itches** heavily in both cases. If one goes by the characteristics of the gait in children with their clothing on (without any other examination) **one may often be deceived**.

But it is not only the peculiarity of the gait, **there are other signs common** to the two diseases.

Unilateral shortening of the leg may exist in coxa vara, as in luxation.

In both cases, walking has begun late, the trochanter is above Nelaton's line ; there is a hollow in the lumbar region and a large abdomen ; there is limitation of the movement of abduction of the thigh, consequent on contraction of the adductors.

How do you distinguish the two affections ? One may say at once, *à priori*, that luxation being 100 times more frequent

¹ Coxa vara may be a congenital deformity, like luxation of the hip, for example, and it very often co-exists with it. But it is generally due to some defect of nutrition of the bone ; rickets, osteomalacia, etc.

A secondary coxa vara may be produced in coxitis (see fig. 674 and 675), or even as a sequel of fracture of the neck badly united.

than coxa vara, there are 99 chances in 100 that one is dealing with congenital luxation rather than with coxa vara.

Then, in the case of coxa vara, there are antecedents and other manifestations of rachitis, but they are not sufficient to establish the diagnosis.

It is necessary to establish the diagnosis thoroughly, because of the absolute difference in the treatment. Luxation can only be cured by reduction. Coxa vara can be cured by the treatment for rachitis, or it may disappear spontaneously. This is how certain lamenesses from birth, mistaken for luxations while they were really coxa vara, have been cured without treatment.

Most fortunately, we have **two certain means** of making a diagnosis :

1st. By means of the X-rays ;

2nd. Without the X-rays, ascertaining, by **palpation** if **the head** of the femur is in its natural position or not.

If you do not find the head of the femur beneath the femoral artery, it is a case of luxation. If you do find it there, it is one of coxa vara.

In short, you are never able to affirm the presence of one or the other of the two maladies until you have made a careful palpation of the hip-joint.¹

Remember that the two conditions may **co-exist**, that coxa vara occurs frequently with congenital luxation.

Diagnosis of coxa vara (unilateral) from Coxitis.

Signs Common to Both.—Lameness, limitation of movement of abduction, slight external rotation of the knee.

Differential Signs.—In coxa vara, the leg is short (and not elongated, as in coxitis at the beginning). In coxa vara, the trochanter is above Nelaton's line. There is no pain on pressure over the head of the femur, as in coxitis.

There are no nocturnal pains. **There are other signs of Rachitis**, etc. The child sways from side to side in coxa vara,

¹ In coxa vara, the trochanter neither ascends nor descends at each step as in luxation (see p. 723).

whilst in coxitis he drags the leg. Further, coxitis is rare at one or two years of age, whilst coxa vara is chiefly seen at that age : Finally, *unilateral* coxa vara is exceptional.

The Treatment of Coxa Vara

One is scarcely ever called upon to treat coxa vara until lameness has set in. The treatment is that of rickets ; general treatment, sojourn by the sea, phosphates, milk diet, etc., and local treatment ; rest and continuous extension.

This treatment nearly always suffices to cure coxa vara in young children, and to bring about, after a year or two, the disappearance of the swaying motion and the duck-like waddle.¹

II.—THE RACHITIC DEFORMITIES OF THE TRUNK

- A. Thoracic Deformities (without Scoliosis or Kyphosis).
- B. Vertebral deviations : **Kyphosis** and **Scoliosis**.

A.—THORACIC DEFORMITIES

These generally assume one of the two following forms :—

1st. *The boat-shaped breast* (fig. 677) ; 2nd. *The funnel-shaped thorax* (fig. 680).

1st. For the first, I advise an irremovable corset in plaster, or, better, a removable corset in celluloid, with an *anterior opening* opposite the thoracic projection (fig. 678).

One will exert over this point a compression with squares of cotton wool, as if one were treating a curvature in Pott's disease (see Chap. V). One will arrive thus at excellent results, fairly rapidly, in the space of 8 or 12 months, on an average.

2nd. It is not so easy to correct the **funnel-shaped thorax** (fig. 679 and 680).

¹ In adolescents, there are some very rare and severe cases where these means are not sufficient and where one is obliged to have recourse to intricate surgical operations (see p. 645).

We have employed here, with some success, the prolonged use



Fig. 677.—Thorax boat-shaped or *en breche*.



Fig. 678.—Corset in celluloid with **anterior opening** for compression in the case of boat-shaped thorax.

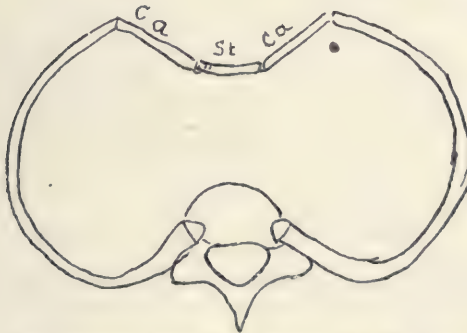


Fig. 679.—Funnel-shaped thorax : St. sternum ; Ca. costal cartilage.

of celluloid corsets with an opening, always patent, opposite the depression.

One removes the corset several times a day, to perform respiratory exercises (p. 578).



Fig. 680.—Funnel-shaped thorax.

Whilst the child makes the movements for enlarging the thorax by forced inspiration, one compresses the two lateral surfaces of the thorax with the hands placed upon it flat. One may also direct these children to blow a horn vigorously; in a word, one makes use of any exercises which will efface, little or much, the thoracic depression.

The child should lie quite flat. Sometimes when he is lying down one may see the deformity slightly lessened on placing a pillow under the back. If that is so in the case of your particular patient, use this simple device during the long night's rest.

B.—VERTEBRAL DEVIATIONS.—KYPHOSIS AND SCOLIOSIS

Rickets sometimes brings about a kyphosis, rarely a lordosis, very often (in 15 cases in a 100 cases of rickets) a scoliosis.

Vertebral deviation may even be, in certain cases, the only (visible) osseous manifestation of Rickets.

1st. **Kyphosis and Scoliosis in children from 1 to 6 years of age.**

DIAGNOSIS

(a) **Kyphosis** (fig. 681).—Rachitic Kyphosis differs from that of a **Pott's disease** (see Chap. V):—

1st. *By the shape of the vertebral deviation*, which is not angular, as in Pott's disease (see p. 235), but rounded.

2nd. *By its situation* which is always in the dorso-lumbar region, or very frequently so (see fig. 681).

3rd. *By the absence of vertebral stiffness*: The patient being



Fig. 681.—Rachitic Kyphosis; the deformity is not angular as in Pott's disease, but rounded.

laid on his abdomen, if his legs are raised backwards (see fig. 214 and 215) the deviation is effaced, whilst in Pott's disease it persists.

4th. *By the absence of pain* on pressure and the *absence of contractures* of groups of neighbouring muscles, whilst both those signs exist in Pott's disease.

5th. *By the antecedents*, and the frequent co-existence of **rachitic lesions** in other parts of the skeleton.

(b) **Scoliosis.**

The **diagnosis of the nature** of the Scoliosis is easy to make in children of from 1 to 6 years, for at that age it is always rachitic (fig. 682 and 683).

TREATMENT

If the deformities are only a little marked, place the child at rest and make him live at the seaside for eight months or a year.

If he cannot go to the seaside, or if the stay there is insufficient to correct very marked deviations, do more, straighten the spine and support it afterwards with a plaster.

One straightens the spine as one would a club-foot, in one or several sittings, with or without chloroform, by manipulations, and by kneading in the direction, or different directions, desired. You begin again with a mobilisation of the spine, already more or less fixed in its defective position. Once this mobilisation is accomplished, you force (with the pressure of 2 or 4 hands) the vertebral column into a corrected position, or a partially corrected position if you proceed by stages. You support the spine in that position with a plaster corset, either a large corset (see p. 270), which would be the best, or a medium apparatus with a "col d'officier" when the large apparatus is objected to by the parents.

You apply the apparatus in a very moderated extension of the spine: the greatest extension which one can make without the heels leaving the ground (see p. 271). In order that your apparatus may be exact and accurate, before the plaster sets, re-make with your hands, by pressure made through the still pliable plaster, the correction you have obtained, and maintain it exactly until the plaster is quite set.

Next day, when the apparatus is quite firm, you will take care to make an opening at all the points where you brought pressure to bear with your hands.

This is necessary; if we do not make such openings, we shall have sores at those points, and, more than that, we shall

lose something of the correction. If we make them, not only shall we have no sores and lose nothing of the correction, but we shall be able to add to it with squares of cotton wool applied in increasing numbers during the following weeks.

But you have already learned to correct the gibbosities of Pott's disease in this way (see Chap. V).

The child will be kept at rest

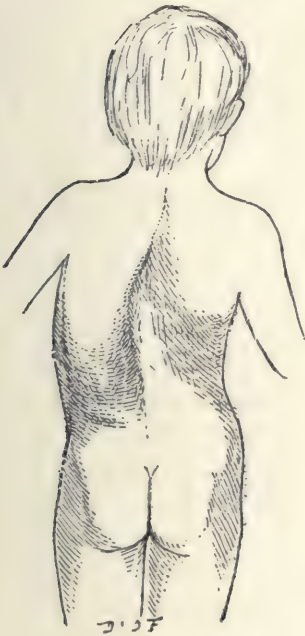


Fig. 682.—Most often rachitic scoliosis has its convexity to the left, as in this case.



Fig. 683.—Rachitic scoliosis of the right side is rarer than on the left side.

in the recumbent position. If the parents force your hand, you may, as a last resource, allow him to walk a little, for instance, half an hour or an hour, every day.

The plaster will be left in position for eight weeks; then you will remove it to make a new correction followed by a new

plaster: and so on, until the correction is effected, which requires from eight to twelve months, and even longer.

When it is complete, one may, instead of a plaster, apply a corset in celluloid or leather, with openings and shutters for compression and the child will be able to walk with the apparatus.

Celluloid has this advantage, that one can take it off every day, and even several times a day, in order to carry out corrective exercises and massage (see *Scoliosis*, Chap. VIII).

In hospital, and in private cases not well looked after, I advise you to keep on an immovable plaster during the period of convalescence.

With very good general treatment, and local treatment carried out in this way, one arrives at surprising results in dorsal deformities of rachitic origin.

I may cite, among others, a child of four years, Pierre B., of Chaumont, who was sent to me by my master Jalaguier; he had a scoliosis so complex and serious, that after examination I scarcely dared to hope that I should arrive at any good result. For a year, the deviation was hardly improved, the general condition remained bad and hampered the continued use of the plasters; but, in the second year, the sea air had fortunately modified the general nutrition, the apparatus were tolerated, so that, after two and a half years' treatment at Berck, this horrible deviation was completely obliterated. I have seen results nearly as striking in the generality of cases.

One may however have to deal with a scoliosis of particularly malignant character, which is very exceptional, but I am able to promise you that, if you carry out the treatment exactly, you will arrive at very satisfactory cures in the rachitic scoliosis of young children.

2nd. **Rachitic Scoliosis of older subjects** [from eight to twenty]. (See note on p. 566.)

What I have just said as to the generally favourable prognosis of rachitic scoliosis is applicable **exclusively to very young children**; for if these rachitic scolioses have not been treated

from their first appearance, if they have been allowed to develop up to 10, 12 or 15 years, their correction becomes very difficult and almost impossible; it is these **rachitic scolioses** which produce, later on, the **occasional cases of severe scoliosis** with lateral bosses. But it is necessary for us to describe how, in a child of from 10 to 15 years, who comes to you with scoliosis, you can recognise whether it is a question of **rachitic scoliosis** or the **essential scoliosis** of adolescence, that studied on p. 567; they are **differentiated** by a great number of characteristics:—

1st. By the **date of appearance**. Rachitic Scoliosis commences in the first eight years of life, that is, before the age of going to school, whilst Essential Scoliosis, “the school complaint,” is specially frequent between eleven and sixteen years.

2nd. By the **clinical and anatomical condition**. Rachitic Scoliosis has a **single curvature**, or, rather, it appears single, the secondary curvatures, cervical and lumbar, being situated very high up, or very low down; the **apex** of the great curvature in rachitic scoliosis corresponds closely to the **middle of the spine**, whilst, in Essential Scoliosis, the curvature, when it is single, has a larger radius, and its apex corresponds either to the back, or to the loins; later, when two curvatures exist, one is distinctly dorsal, the other distinctly lumbar, and they often have an obviously equal importance.

3rd. As we have already said, **by their very different prognosis**.

Rachitic scoliosis is essentially, and, by its long standing, much more insidious and more serious than “essential” scoliosis.

The great deformities, the lateral gibbosities like the sides of a melon, the twistings and depressions of the trunk, which make, in a word, the **Malignant Scolioses**, belong **almost exclusively to true Rachitis**. Here, the bones are eburnated, the articulations already more or less ankylosed, which adds still more to the difficulty of the treatment.

The treatment is like that of Scoliosis of the third degree (see p. 599); it is here, in fact, a question of Scoliosis of the third degree. At first a treatment by gymnastics is necessary to mobilise the spine, then forcible corrections every three months, followed by the application of a large plaster apparatus.

One keeps to these rigid apparatus until the fixation of the spine in a satisfactory position. This treatment requires from two to three years, the patient sojourning at the seaside. It is, then, comparable to that of Pott's disease.



Fig. 684.—Very old rachitic scoliosis (3rd degree).

Once more, take care how you undertake the treatment of these malignant scolioses against which we are still so poorly armed, and of which one authority¹ has been able to say with so much truth: "Since congenital luxation has ceased to be the opprobrium of surgery, the title has gone by right to the old rachitic scolioses."

In attempting the treatment of these bad cases (see fig. 684), which are not worth the disappointment, practitioners may learn to remember *à propos*, that there exists some part of the specialist's work which they should let pass.

¹ Dr. Berguignat.

CHAPTER XI

GENU VALGUM (OR VARUM) OF ADOLESCENTS; COXA VARA OF ADOLESCENTS

It is with a purpose that we are studying these deformities immediately after Rachitis to which they are connected in more than one respect, so much so that they may be confounded with it.

Much might be said on this point but we wish here to avoid all pathological discussion, and we will simply maintain, as to this relationship, that in the presence of genu valgum and coxa vara of adolescents we shall have to carry out, as for rachitic deviations, in addition to the local treatment of the deformity, a **general treatment**: (a) dietetic (milk, eggs, etc.); (b) climatic (life by the sea, if possible); (c) medical (cod-liver oil, iodine, phosphates and phosphorus in all its forms).

The general treatment you know; the **local treatment** is equally well known to you, after what we have said of genu valgum and coxa vara in young children.

1ST. GENU VALGUM (OR VARUM)

The deformity exists on one or both sides. Refer to p. 608, where we have indicated the course to be followed. As in young children, correction here may be obtained by simple **straightening** of the knee, or by supra-condylar **osteotomy**.

Of these two treatments, which will you choose?

If you are something of a surgeon, perform osteotomy, a benign and simple and *more expeditious* operation, the particulars of which are set out on p. 621.

But if you, or the parents, wish to avoid "a hole in the skin" and the effusion of a drop of blood, you can do so; you can straighten the limb by simple orthopædic manipulations at this age, as in young children; only it will require a little more time.

And, in the same way as in young children, if the parents



Fig. 684a.—A case of genu varum (already treated for three years, without result). This before our treatment. (See the two following figures.)

demand of you a treatment not involving the impossibility of walking, you will be able to satisfy them, because the cure can be obtained in spite of walking, on the condition that you are given the additional time you desire.

In that case, to allow of walking, you terminate your plaster above at the upper border of the great trochanter, and below, opposite the malleoli (see fig. 656).

In the case of **genu varum**, one carries out a similar treatment in the opposite direction.

2nd. COXA VARA OF ADOLESCENTS

We have spoken of coxa vara in young children on p. 629. According to German authors this deformity is generally



Fig. 684b.—The same case after our treatment. Straightening was effected by stages.



Fig. 684c.—The same after the third plaster.

observed in young persons who are employed in the fields; hence the name *Bauerbein* to distinguish it from *Backerbein* (baker's leg) given by them to the genu valgum of adolescents; however, I ought to say that, for my own part, I

have seen it only in private cases, still attending school. I may add that this deformity is very rare in France, if I can trust my own observation. I have not seen more than 20 cases in 20 years, whilst the Germans say they encounter it very often.

The position of the lower limbs in Coxa Vara is characterised by a tendency to adduction of the thighs and to rotation outwards (fig. 685).

The **first sign** may be the occurrence of a pain caused by some insignificant injury, or a feeling of weakness in the legs; but most usually the first sign is here, as in young children, a **defect in walking**, a defect which progresses insensibly until it becomes a real lameness. In advanced cases, one sees the patients stagger, *sway and waddle*, so that one thinks it is either a coxitis beginning, or a congenital dislocation of the hip unrecognised until now, or even an acquired luxation, in the case where the patient attributes the origin of the lameness to a fall or a sprain.



Fig. 685.—Attitude in coxa vara, adduction and external rotation.

The **diagnosis** will be made between the two maladies, as in young children, either by clinical signs alone (see p. 629) or by the X-rays.

The Treatment

A. *General anti-rachitic treatment* ;

B. *Local Treatment* :

(a) For mild cases, rest and extension in abduction for 5 or 6 months.

(b) For cases rather more pronounced, one adds kneading or

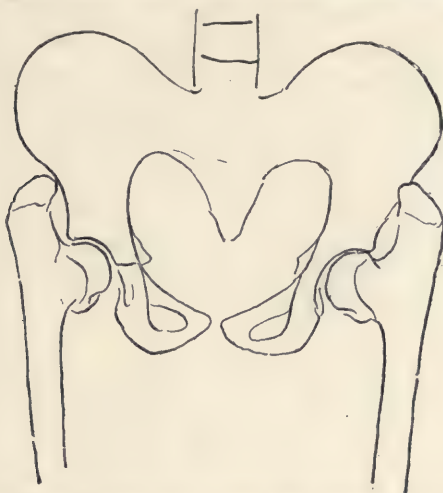


Fig. 686.—A severe case of coxa vara (after a radiogram of one of our patients, aged 14 years).



Fig. 687.



Fig. 688.



Fig. 689.

Fig. 687.—1st step of operation : separation of the neck from the diaphysis.

Fig. 688.—2nd step : refreshment of internal face of great trochanter.

Fig. 689.—3rd step : traction on the diaphysis and placing in contact the neck and the refreshed face of the great trochanter ; then a plaster apparatus with continuous extension.¹

even tenotomy of the adductors of the thigh, which are always

¹ See, as to the association of plaster and extension, my "Orthopædics in War," 3rd edition, figs. 239 to 258. Published by Maloine.

a little contracted. And one succeeds thus, in a few months, in effacing entirely the defect in walking.

(c) But, in very advanced cases (fig. 686), it is necessary, in order to obtain a cure, to have recourse to osteotomy.

We will review all the details of the surgical treatment in the additional notes on coxa vara placed at the end of the book.

CHAPTER XII

TARSALGIA OF ADOLESCENTS, OR PAINFUL FLAT FOOT

A.—Diagnosis

BEFORE setting out the treatment, we ought to say a word as to diagnosis; it is necessary, seeing that, in seven cases of tarsalgia which have come under observation in six months, we have seen three errors of **diagnosis** committed by well-informed practitioners.

The first had been mistaken for **rheumatism**, the second for a **tuberculous arthritis**, and the third for a **dislocation of the foot** outwards, which is difficult to understand at first, but which is explained in a certain measure by the exceptional contracture in this case (such as we had never seen before) of the peronei and the extensor communis digitorum, which had drawn the foot outwards in valgus, to a point which closely simulated a real dislocation.

In the other two cases, it was the weakness and aching of the foot which had led to the belief that they were cases of rheumatism and white swelling respectively.

Three mistakes in seven cases, it is too much! Yet exact diagnosis was important here in the highest degree; for, if it were a question of **tuberculous arthritis** (a **blunder commonly made**) one ought to put the patient to rest for at least a year; if it is a question of tarsalgia, the patient, on the contrary, ought to walk about as soon as the foot is straight, almost at once, and the cure will be complete in two months.

You see the unpleasantness to which one is exposed in mistaking the true nature of the malady.

By what signs can one recognise tarsalgia ?



Fig. 691.—Valgus flat feet : one sees in this figure the abduction *en masse* of the foot and the sinking of the plantar arch. Prominence of the scaphoid on the inner border.

1st. *By the age* of the patients—they are adolescents.¹ Thus, then, in the presence of a painful foot in a patient of from ten

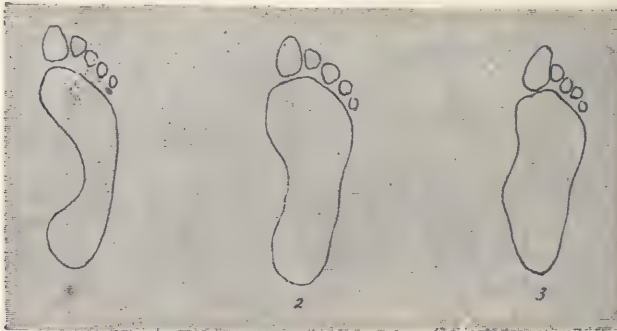


Fig. 692.—1. Imprint of the normal foot.
2 and 3, Valgus flat foot in two different stages.

to twenty years, *one ought always to think of a possible tarsalgia* and verify the value of this presumption.

¹ Nearly always.

2nd. *By the character of the pain*—which has come on generally after a rather long walk, and which has disappeared completely after a night's rest; then, it reappeared on certain days, when the patient was fatigued, and did not show itself otherwise. The pain was, at the beginning, a sensation of cramp in the calf and the foot; later on, this became such an agonising sensation of stretching of the foot that it was impossible for the patient to take a step.

3rd. *By the shape of the foot.* It is necessary to examine the foot naked (fig. 691) with the patient standing upright.

(a) **The foot is flat**; it has no vault; it stands on the ground with the entire sole (fig. 692); the internal border is convex inwards, the apex of the convexity, that is, the most prominent part, being formed by the head of the astragalus and the scaphoid which sometimes touch the ground.

The external border, on the contrary, is almost concave.

(b) The foot is thrown *en masse* outwards, in valgus; this is especially marked when the foot is inspected from behind; the axis of the leg falls well inside the middle of the heel.

(c) When the patient is in the upright position, the foot becomes of a violet hue, it presents varicosities and is sometimes covered with perspiration.

4th. **By palpation of the foot**, which is negative at the outset, one finds neither pulpiness nor pain on pressure over the bones. At an advanced stage, the foot may be swollen, it

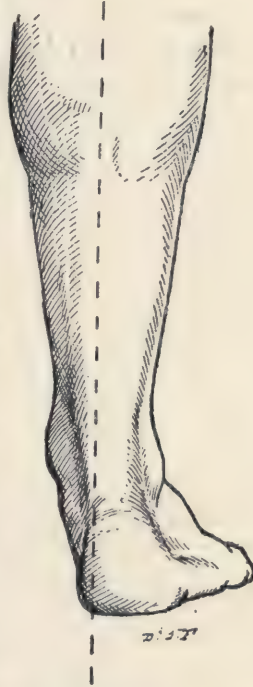


Fig. 693.—Flat foot seen from behind; the axis of the leg falls inside the heel.

is true, but it is an uniform œdema, there is no collerette nor any pulpy points over the course of the articular synoviæ, as in tuberculous arthritis; there may be, however, at this time, pain on pressure over the bones, always localised at the internal part of the astragalo-scaphoid articulation (fig. 694). The diagnosis will be easy even in this case, thanks to the history, to the shape of the foot, and to the absence of pulpiness.

5th. **By both feet being very often affected**, although in unequal degrees (see fig. 691). The patient complains of only one of the feet, that which causes him the most suffering. It is



Fig. 694.—The painful spot is situated nearly always at the inner end of the medio-tarsal joint. Here, it is a little in front of that.

for you to remember always to examine the other; oblige the patient to recall if he has not suffered a little in the other foot also.

6th. By what one often finds, that **the same conformation** of the foot exists **in other members of the family** without pain being present in every case.

We ought to remark, however, that a child with a flat foot is in a condition, just like any one else, to produce a tuberculous arthritis; one would then find the signs of the two maladies superposed.

Upon the whole, and in ordinary cases, the elements of the diagnosis are included in the denomination synonymous with

tarsalgia, namely, **painful valgus flat foot of adolescents** ; they are all present :—

- (a) **Foot flat.**
- (b) **Valgus.**
- (c) **Pain.**
- (d) Patients from **20 to 30 years of age.**



Fig. 695.—Correction of abduction. The foot is carried bodily inwards, in the direction of the arrow: the dotted line shows the normal attitude of the foot.



Fig. 696.—Flat foot, front view; depression of the inner border.



Fig. 697.—The inner border is raised, the external depressed in the direction of the arrows.

B.—Treatment

The diagnosis being made, what will be the treatment? That depends upon the variety, or, rather, upon the clinical form of the tarsalgia.

One can distinguish **two forms**, one **mild**, the other

severe, which correspond in a general way with the two periods of the disease.



Fig. 698.—The thumbs are placed over the tubercle of the scaphoid; the other fingers of the right hand clasp the internal surface of the os calcis, leaving those of the left hand at the anterior part of the external border of the foot. The thumbs serving as a fulcrum, the two hands work so as to curve the internal border of the foot.



Fig. 699.—Flat foot seen on the plantar surface.

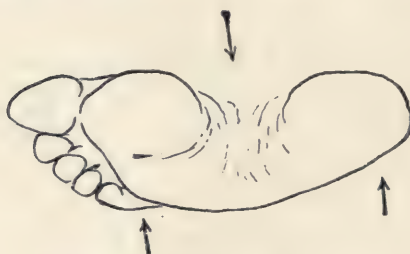


Fig. 700.—Schema of the manipulation described in fig. 698.

In the first, it is a question of a commencing subsidence of the foot under the weight of the body; pain is present only on walking, and then only on taking rather long walks.

In the second, there is a secondary inflammatory arthritis; a contraction of the peronei and extensor communis muscles; the foot is painful at rest and on pressure; it is fixed in valgus, and resists "like a piece of wood" if one attempts to place it in varus; and such attempt is very painful.

Loss of power is complete, or almost so.

Whatever may be the variety of the tarsalgia, the rational treatment is to *alter the statics of the foot, to return it to its normal position and to keep it there.*



Fig. 701.—Raising the inner border of the foot.

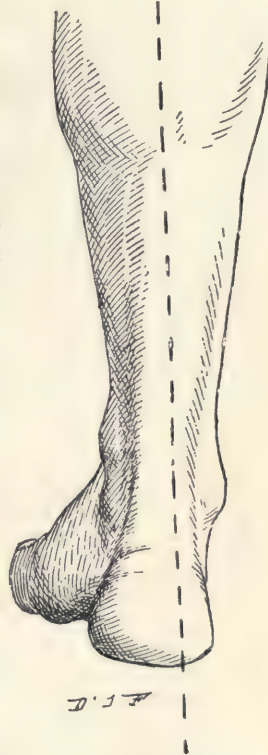


Fig. 702.—Foot corrected: compare this with fig. 693. The axis is over the outer border of the heel.

TREATMENT OF THE FIRST (MILD) VARIETY

(a) The foot is massaged once or twice a day, is carried into correction, or, rather, hyper-correction, in one sitting of ten minutes, with manipulations in the opposite direction to those

made in ordinary club-foot in varus (fig. 695, 696, 697, 698, 699, 700, 701, 702). You explain to the parents how the manipulations are to be performed.

(b) The patient is made to wear a boot with the inner border raised two centimetres by an artificial sole, to re-form the arch of the foot (fig. 703).

This is sufficient in very mild cases, and the patient is able to continue his ordinary mode of life. If it is not sufficient, one

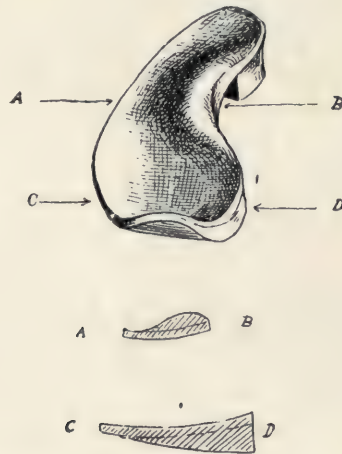


Fig. 703.—Artificial sole for valgus flat feet. It is very much curved at its inner border: the sole and the heel are much thicker on the inner than the outer side; at the arch of the foot, it is furnished with a soft pad intended to raise the inner border of the foot.

adapts to the boot our lever-sole, in the way represented (fig. 704, 705, 706, 707). Thanks to this boot the patient becomes able to walk immediately like a normal person; it is indeed necessary for him to walk, because, in walking, the foot becomes shaped more quickly than when remaining at rest.

After from six months to a year, one can return to ordinary boots, simply providing them with an inner border a centimetre higher than the outer.

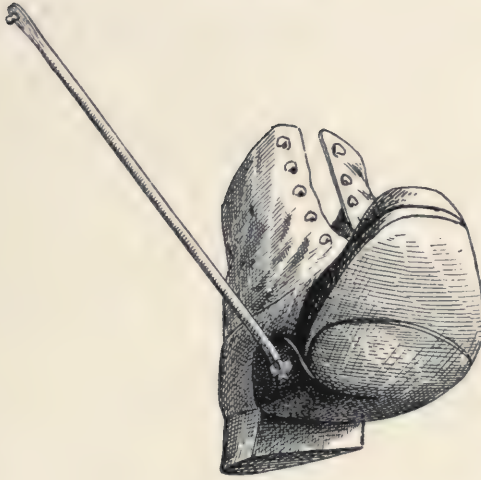


Fig. 704.—Our lever-sole adapted to a boot (view of plantar surface).



Fig. 705.—Our lever-sole, viewed on inner aspect.

TREATMENT OF THE SECOND, OR SEVERE, VARIETY OF TARSALGIA

The foot is powerless and painful, and is fixed in valgus.

If one wishes to manipulate it, the patient cries loudly, and, nevertheless, it must be manipulated. This is how it is done.

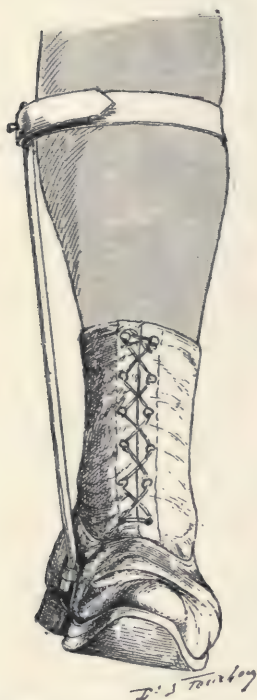


Fig 706.—Our apparatus applied.



Fig. 707.—The trouser hides the lever.

A. With Chloroform.—There is an easy and expeditious way to succeed in this; it is to put the patient to sleep for five or ten minutes, to place the foot in varus, in adduction, in such a way that the inner border becomes concave and raised, and then to fix it immediately in a plaster (fig. 708, 709), with which the patient is able to walk the next day.

B. Without Chloroform.—In the case where the parents dislike either chloroform or plaster, you can still arrive at a cure.



Fig. 708.—After the manipulations, one puts on a plaster apparatus supporting the foot in hyper-correction: this apparatus ought to leave only the toes free.



Fig. 709.—Plaster seen from behind: one strengthens with a plaster buttress the inner border of the sole, in order that the plantar surface is perpendicular to the axis of the leg and placed quite flat on the ground (in order to facilitate walking).

1st. *You are able to redress the foot*, proceeding as you would in the treatment of a very painful sprain. You commence by

massaging the foot, at first very gently, scarcely touching it, for



Fig. 710.—Construction of our lever sole. The foot is placed on a sheet of paper and the contour traced with a pencil.

several minutes, in order to deaden and benumb the sensibility and overcome the spasms ; then you proceed a little less gently,



Fig. 711.—Tracing of the foot in outline. The dotted lines show the form of the sole which will be cut out of sheet iron for the lever-boot.

then more vigorously, and after fifteen minutes you are able, without causing pain (or with the least pain imaginable, and

quite supportable by the patient), to knead it, work it, and place it in varus at one stroke, or, at least, in a nearly correct position, postponing until the next day, or the day afterwards, at a third or a fourth sitting, the effort to obtain hyper-correction in varus.

You may order two sittings for massage each day.

2nd. *To support the foot.*—You proceed, at the end of each sitting, to fix it with our lever, which is represented here

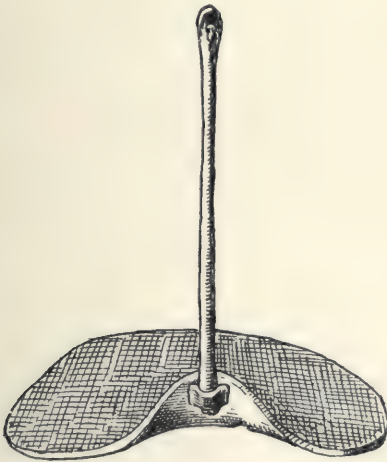


Fig. 712.—View of inner side.

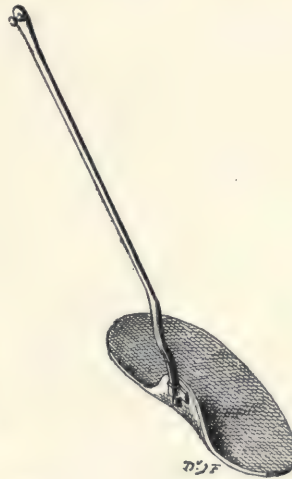


Fig. 713.—Seen from behind.

(fig. 710 to 717), and, from the second or third day, the patient will be able to walk with the apparatus within a suitable boot, as he would with a plaster apparatus. Plaster has this advantage, that one has no need to touch it for six weeks. On the other hand, the lever sole is often more favourably received by the friends of the patient; it may be changed at will; one repeats the massage every two or three days; in the interval of the sittings the patient continues to wear the sole (that is, day and night) in order to shape the foot.

After six weeks, one removes the plaster or the lever-boot,

and it is replaced by an ordinary shoe with the inner border raised and slightly vaulted; to this shoe is adapted a lever of the kind represented here. With an "elephant's foot" trouser, or simply a rather wide one, and, better still, with gaiters, one hides the lower part of the lever very well.

The patient wears this boot, in severe cases, for a year or

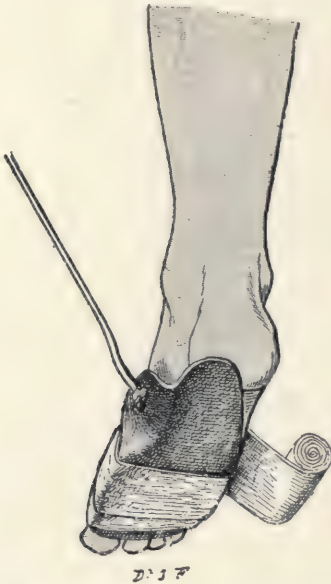


Fig. 714.—Application. One fixes first the fore part of the foot with several turns of Velpeau bandage. The heel overhangs the extremity of the instrument behind.



Fig. 715.—A cast of the bandage forces the heel inwards on to the apparatus; the inner border of the foot is then found to be arched.

two, to shape his foot and with this very convenient support, he comes and goes like an ordinary individual. As time goes on, the patient can wear, if need be, a shoe raised a little on the inner side.

And that is all. See how simple and methodical the treatment is.

There may be brought to you, an individual who has been

completely helpless for several months. Almost instantly, on



Fig. 716.—The foot is firmly fixed to the artificial sole.



Fig. 717.—The lever drawn against the calf raises the inner border of the foot and replaces it in adduction.

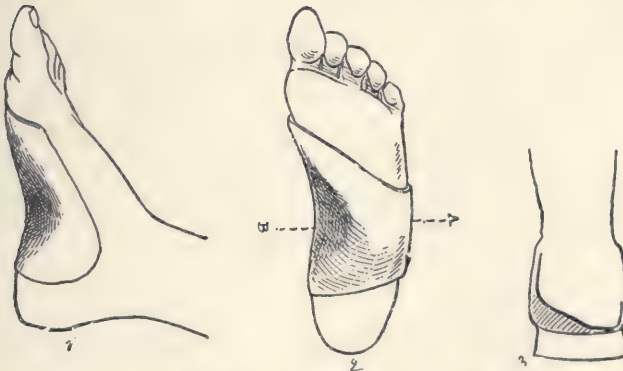


Fig. 718 and 719.—Simple steel sole (in the boot) which suffices for mild flat foot at the **beginning**: 1, Inner surface; 2, Plantar surface; 3, Sketch of the boot furnished with the artificial sole (according to AB in fig. 2).

the first day, or at least the next day, you have relieved him

of all his pain, and he becomes able to walk as much as he likes.

And this small miracle you will certainly work, because all the cases are suitable for this treatment.

Value of Surgical Operations.

Then, as to surgical operations for the severe cases, the operations of Ogston, of Vogt, of Trendelenburg . . . that is, cuneiform resections of the bones, excision of the astragalus, etc. ? . . . I never perform them now.

Formerly, I treated old standing tarsalgias with the saw or the chisel, like all other surgeons. To-day, I treat the same severe cases by vigorous shaping of the foot, with or without chloroform, followed by the application of a plaster or of a lever-sole; and I cure them, not only as well, but certainly better than by my surgical operations of earlier days. I have not seen, for six or seven years, a single tarsalgia which has resisted orthopædic treatment.

This **treatment**, besides its admirable **efficacy**, presents the precious advantage, that it is **very simple** and **may be carried out everywhere**, by each of you.

CHAPTER XIII

INFANTILE PARALYSIS

BEFORE touching upon the treatment of Infantile Paralysis, we wish to mention what it is necessary *to know about electricity* : 1st, in order to make a **diagnosis** of the condition of the affected muscles ; 2nd, in order **to combat muscular atrophy**, seeing that this information does not appear to us to have been anywhere set out with the precision and clearness which is desirable.¹

One utilises for this purpose the Galvanic or Continuous current and the Faradic or Induced current.

Apparatus Employed.—The Galvanic current is furnished by a battery of 30 cells (fig. 721) which can be bought together with the necessary accessories, which are : a collector and resistance to graduate the current, a milliamperemeter to measure it, an interruptor and reverser to complete it, to interrupt it, to modify its direction ; tin plates and buttons covered with felt or chamois leather, with which to apply it to the patient, and a pair of pliable wires for establishing the connections.

The Faradic current is furnished by an induction coil fed by a battery and (fig. 723) supplied with an interruptor which can be regulated. The induced current can be augmented or diminished at will. The induction coil ought to be of thick wire.

Method of Employment.—The electrodes are moistened with warm water. One of them, very large, of from 100 to 150 square centimetres called the indifferent electrode, because it serves only to close the electric circuit, is applied against the middle of the patient's back, if it is a case of paralysis of the lower extremities ; at the nape of the neck if it is a question of the upper limbs. It remains fixed during

¹ These few pages have been drawn up by my old assistant, Doctor Berguignat, of Argelès-Gazost, who is a particularly competent electrician.

the whole of the sitting ; the other, smaller, and of olive or spherical shape, called the active electrode, is applied over the muscles to be electrised, and moved about in any direction required. One establishes the connections with the terminals of the induction coil, or with the poles of the battery, taking care to establish the current *gradually*, and, in the case of the continuous current, determining *exactly the direction of the current*, the active electrode being, according to the case, positive

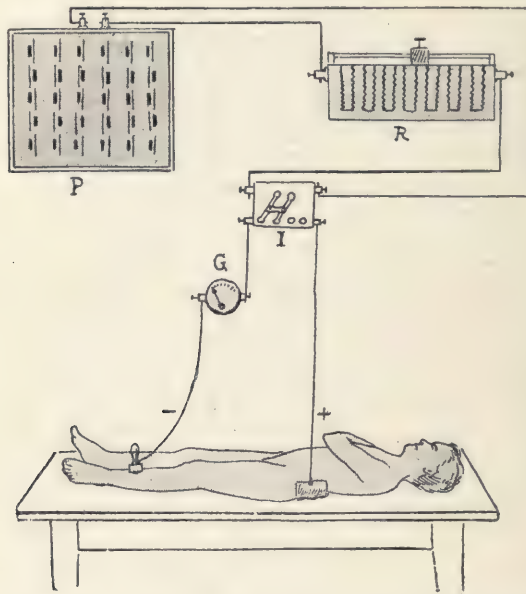


Fig. 720.—Schema of an apparatus for supplying the continuous current and the connections for its application to the patient. The Resistance enables one to graduate the current. P, Battery of 30 cells ; R, Resistance ; I, Interruptor-reverser ; G, Galvanometer.

or negative, and not having the same effects. The second electrode is sometimes replaced, for electrification of the limb, by a trough of water, into which the hand or the foot is plunged (fig. 724).

Exploration of the Muscular Contractility.—For this, the strength of the currents employed should be just enough to produce contraction, and it is necessary to localise the active electrode exactly over the motor points of the muscles.

In the normal state, the Faradic current produces muscular

contractions during the passage of the current, more or less strong according to its intensity ; a series of isolated and repeated contractions if the interruptions are sufficiently slow, a sustained contraction if the vibrations of the interruptor are rapid.

The Galvanic current, which has profound effects upon the nutrition of the muscles and favours their development, provokes tingling and a sensation of heat at the points of contact of the electrodes ; *but if the current has been established gradually,*

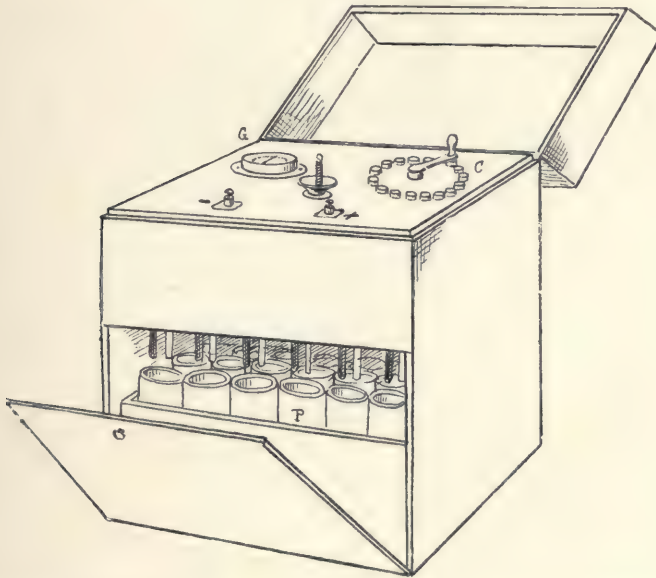


Fig. 721.—Model of a portable case with switch. G, Galvanometer ; C, Collector ; P, Cells.

without jerking, and diminished in the same way, there will be no contraction of the muscles during the passage of the current. On the other hand, if one abruptly cuts off the current and if one re-establishes it as abruptly, the muscle receives at the break and at the make of the current a galvanic shock to which it responds by a contraction, brisk, sudden, and immediate. This contraction varies with the intensity of the current, its direction, the nature of the galvanic shock received, whether it make or break. A normal ratio exists

in the order of appearance of the contractions when the current is

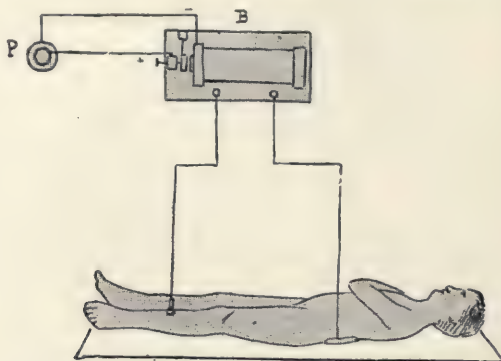


Fig. 722.—Schema for an apparatus for supplying the Faradic current and its connections. P, Cells; B, Ruhmkorff's Coil.

slowly increased from 1, 2, 3, up to 20 milliampères, and in their force for the same intensity of current. At 1 or 2 milliampères,

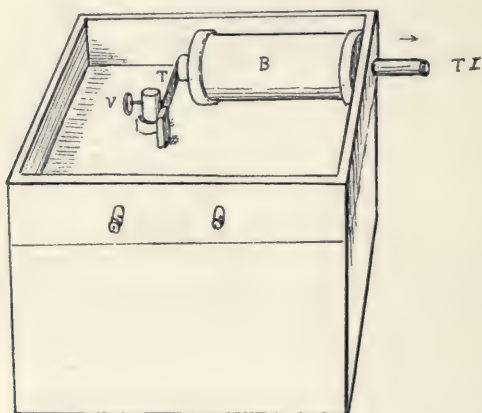


Fig. 723.—Portable Induction Apparatus: When the tube is drawn in the direction of the arrow, the current is augmented. B, Ruhmkorff coil; T, Interruptor; V, Screw of the interruptor; TI, Secondary tube.

the closure contraction occurs if the active electrode is negative; at 3 milliampères, the closure contraction occurs with the positive

electrode ; at 3 or 4 milliampères the break contraction is observed with the positive electrode ; with the negative electrode, the break contraction only shows itself if the current rises to 15 milliampères.

With a current of from 15 to 20 milliampères, one obtains a contraction with the two poles, indifferently at the make and break of the current, but at the make the contraction due to the negative



Fig. 724.—Position of the patient for application of the continuous current in the case of infantile paralysis, left leg. The electrode on the back, held by means of a bandage, is positive ; the trough of water represents the negative electrode.

pole predominates, whilst at the break it is the contraction due to the positive pole which is the stronger. On the other hand, the contractions produced by the abrupt make of the current are always stronger than those following the break.

As to pathological conditions : when a muscle is attacked by infantile paralysis, it does not react normally to electrical excitation. At first, it becomes less and less excitable to the Faradic current. When the case is advanced,

there is no contraction with this current, whatever its intensity may be.

Galvanic excitability at the same time is increased or diminished, the relations between the contractions obtained remaining the same as in the normal condition.

This being so and modified, the muscle being found inexcitable by the Faradic current, then there exists what is called, by Erb, the Reaction of Degeneration. The contraction due to positive excitation will be stronger at the closure of the circuit than the contraction due to negative excitation. This is the reverse of that which occurs in the normal condition; the same reversal may be produced at the break of the current. It is this disturbance caused in the normal order of muscle response to the Galvanic current which characterises the Reaction of Degeneration.

In addition to this, the contraction produced no longer exhibits its character of instantaneousness; it is slow, sluggish, retarded. In the gravest cases, the muscle remains inert when either the Faradic or the Galvanic current is applied to it.

The Value of Electricity in Establishing the Prognosis

From the muscle reactions thus obtained one may draw interesting conclusions as to the prognosis of the disease.

I. When the muscles show only a diminution of their **contractility** to Galvanism and Faradism, one may hope for a **rather rapid return** (in 8 to 10 months) of their motility.

II. If they have become **inexcitable** to Faradism, but **react** still to **Galvanism** without the reaction of degeneration, the case is still **curable**, but a year or a year and a half of treatment is necessary.

III. If the muscles present the **reaction of degeneration**, one may still hope for an **amelioration** if the **treatment** is applied with **perseverance**.

IV. Finally, when the muscles **have lost all electrical excitability in spite of methodical treatment** continued for **a year**, their **function** is irremediably **lost**.

The Electrical Treatment of Paralysed Muscles

The electrical treatment of infantile paralysis may be summed up thus :

1st. **Early** commencement of treatment : two or three days after the disappearance of the febrile attack.

2nd. The employment of **galvanic** currents of from 10 to 15 milliampères applied two or three times a week by means of two very wide electrodes, the *positive* plate placed on the back, the negative being represented by a basin of tepid water into which the extremity of the limb is placed. Duration of the passage of the current : 10 minutes. Take care to reach this strength of current slowly, commencing at zero at each sitting.

3rd. Produce at **the end** of the sitting some contractions by **abrupt interruptions** and reversals of the current.

4th. After the above treatment, which is directed to the limb, electrise, by means of the button electrode, **muscle by muscle**, those muscles which are found most sluggish. Use for this the same form of current as in the preceding, *i.e.* the galvanic.

5th. *No faradic current* : one **may** employ it **in order to ascertain** from time to time the muscular reactions, that is, for the purpose of diagnosis, *but it should not be applied as treatment*.

6th. Much **perseverance** is necessary on the part of the physician and the patient, for the treatment may be of long duration ; when it is likely to last for more than a year, it is well to allow a rest every three months.

7th. Before considering a muscle as definitely **paralysed** and **giving it up**, one must **be certain** that, in spite of the treatment employed, there is no re-appearance, for at least **a year**, of electrical reaction.

THE TREATMENT OF INFANTILE PARALYSIS

I occupy myself here with Infantile Paralysis from the orthopædic point of view alone. It brings about deviations and loss of power more or less serious. What is to be done ?

There is no general rule to be adopted in every instance. The course to be followed depends on each case, and the cases differ much from one another.

We will pass in review the different clinical forms which one may encounter, and point out the treatment in each of them.

The treatment may be **orthopædic** or **surgical**.

I.—PURELY ORTHOPÆDIC TREATMENT

(that which all practitioners can apply)

A.—The Infantile Paralysis is Localised in the Foot

You know that it is the foot especially which is attacked. One can differentiate three varieties :

1ST VARIETY : *All the muscles of the leg are affected—slightly and uniformly. There is no deformity.*

2ND VARIETY : *All the muscles of the leg are affected, their functions completely lost. The foot is limp.*

3RD VARIETY : *One muscle only*—or two or three muscles only—are affected, and one has a *paralytic club-foot* (produced by the predominating action of the antagonistic sound muscles).

1ST VARIETY : The child drags the foot a little and is slightly unsteady on that side in walking ; when one examines the limb, one finds a *little weakness*, but *no deformity* (fig. 725). On comparing the limb with that of the opposite side, one finds that its development is rather behindhand ; all the muscles are a little more flabby, a little less strong ; but this diminution is *very little marked* and, moreover, it is spread over *all the muscles* which ensure the equilibrium of the foot and the preservation of its proper posture.

The treatment is very simple.

Here, apparatus or operation is out of the question. The

only thing to do is to strengthen all the muscles of the foot, by massage, by electricity, warm sea baths, or warm sea-sand baths, or even by the baths of Bourbonne, of Aix, of Argelès-Gazost, of Salies, etc.

If there should be at the same time a shortening, one may correct it by a special heel to the boot.



Fig. 725.—Infantile Paralysis of the right leg. All the muscles are affected (slightly so). There is no deformity.



Fig. 726.—All the muscles of the leg have been attacked and are completely paralysed; the foot is limp, the thigh is normal.

2ND VARIETY (fig. 726): *All the muscles of the foot are affected very seriously*, entirely, or almost, **useless**; the skin is cyanosed, the **foot** is **limp** and cold. It is placed in **equinism** by the sole effect of **gravity**

Here there is no need for hesitation.

You will straighten the foot, dividing the tendo Achillis if it is necessary, in order to obtain the correction. When the foot is straight, you take a mould, upon which you will make a rigid boot with strong buttresses for fixing the foot in position.

The mould removed, you place on the foot a plaster which you leave on for four or six weeks—the time required for making the boot. This should be well padded to prevent sores on the badly nourished skin. The boot is worn during the day, and even during the night, at the beginning, until adhesions have formed which fix the foot at a right angle.

3RD VARIETY: The Paralytic Club-Foot.—Here there is a deformity of the foot which is produced little by little; it is nothing at the beginning, but it ends in becoming a veritable **club-foot**.

It may be an equino-valgus, or a club-foot, or a hollow foot, or an equino-varus.

Diagnosis.—One distinguishes it from **congenital club-foot**: 1st, by its shape; 2nd, by its history; 3rd, by examination of the limb; 4th, by the relative facility with which you are able to straighten it.

(a) *The Shape.*—Whilst congenital club-foot is nearly always equino-varus, the paralytic club-foot is very often equino-valgus or equinus, or talus valgus, hollow foot, etc.

(b) *The History.*—In paralytic club-foot, the foot was normal at birth, and generally the child walked well at the usual period of 12 to 14 months. At a year and a half or two years, a **fever**¹ supervened, with or without **convulsions**; the limbs were almost completely paralysed for several weeks, then the paralysis disappeared from every part, except the foot, which took, little by little, the defective shape you now see.

When you have a history so clear as this, the diagnosis is obvious. When the history is not so clear, the diagnosis is naturally less certain. It will then be wise to look for other symptoms.

(c) *Examination of the Patient.*—If it is a question of a paralytic club-foot, you may find signs of infantile paralysis in the foot or leg, namely, foot less warm or even cold, skin more or less rosy or even violet on that side, which is evidence of defective nutrition; the

¹ Most often at night-time.

musculature of the leg is more flabby, owing to lack of contractility in certain muscles ; in a word, you are in the presence of a paralysis, or of a paresis, of one or several muscles, of a manifest atrophy either of the leg, or even of the whole lower limb.

I know, of course, that in congenital club-foot there is a slight amount of atrophy, but to an incomparably less degree ; the muscles are always much stronger and firmer.

(d) *Easiness of Redressment*.—This again is a very valuable diagnostic point, so much so that one is able to establish, as a general rule, that a club-foot of six, eight, ten years' standing, which one is able to straighten in eight or ten minutes, is not a congenital club-foot. That, at this age, would require for its correction, three-quarters of an hour of vigorous manipulations.

The Treatment of Paralytic Club-Foot

1st Degree.—*Simply a tendency to a bad position.*—There exists, as yet, only a tendency to deformity ; but, if nothing is done, this slight tendency may run one day into very serious deformities.

The only harm done so far is the wasting of a single muscle which the paralysis has slightly affected.

It seems that, if we were able to assist this slightly weakened muscle, we should re-establish the equilibrium and make sure of the future. As a matter of fact, we can do this by supplying the child with an *artificial muscle*. This expression need not alarm you ! There is nothing more easy to do, as you can see by looking at the pattern represented here of an artificial muscle which I have had made by the mother of one of my little patients (fig. 727 and 728).

If the foot has a tendency to be carried slightly outwards and in extension (slight equino-valgus), it is nearly always due

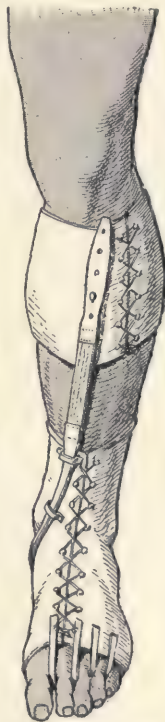


Fig. 727.—Artificial tibialis anticus.

to a paresis of the tibialis anticus. One can **ascertain** this by comparative electrification with the opposite side; or, more simply, by inducing the child to make the movement peculiar to the muscle, namely, to place the foot inwards and to bend it

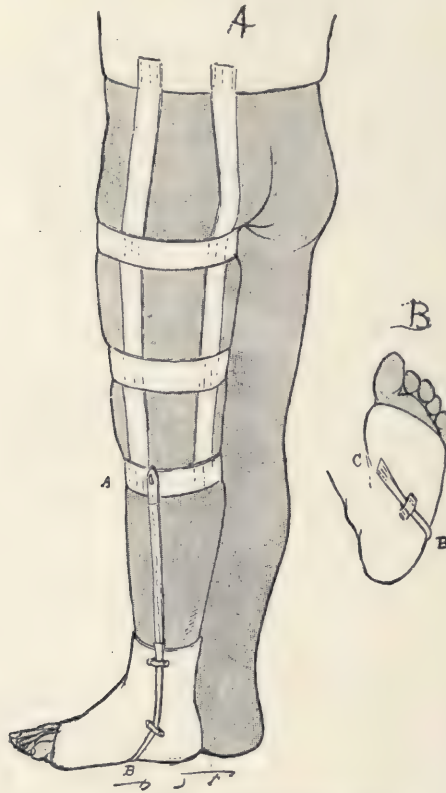


Fig. 728.—Artificial peroneus longus.

on the leg, whilst one palpates the muscle and compares it in every way with the tibialis anticus of the other leg.

It is manifestly weaker than that. It is then desirable that we should help it with an “**artificial muscle.**” This is a canvas gaiter, to which one attaches the two extremities of the

artificial tibialis anticus, giving to it the attachments and direction of the real muscle. It is composed of an **elastic part** (simply 2 or 3 folds of elastic webbing fastened by a few stitches; this is not fixed to the gaiter and is able to move over it), and of two **rigid extremities** (cords or tapes, representing the tendons and stitched to the gaiter opposite the natural points of insertion of the muscle (below, opposite the inner side of the internal cuneiform bone, and above, opposite the external tuberosity of the tibia), and there we have our artificial muscle made.

There are certain peculiarities to point out in its construction. Below, the gaiter encloses the extremity of the foot like a sock, and above it rises up to a point below the knee or is fixed to the waistcoat by a garter. This double arrangement prevents any sliding; it prevents the twisting of the two ends of the gaiter (which would be brought about otherwise, by the traction of the elastic part). Strictly speaking, one can do without the real gaiter by simply placing, opposite the fleshy belly of the muscle, a portion of elastic webbing carrying at its extremities two canvas thongs passing upwards and downwards the length of the limb and attached opposite the articulations by bands of similar canvas—real annular ligaments and flexion pulleys: the upper attachment will be the garter, the lower attachments, two small cords passed between the toes.

There are some children who do not tolerate the two cords between the toes. In that case, be content with tightening behind, but very near to the toes, the annular band of canvas, so that it may not be turned over by the traction of the artificial muscle, or, still better, use the entire lower end of an ordinary sock.

This (fig. 727) is the artificial muscle which helps the paralysed tibialis anticus; the case of a foot in which the point goes a little outwards and downwards (slight equino-valgus).

To help the peronei (the case of a foot going inwards), the muscle will have the arrangement represented (fig. 728).

To assist the extensor communis digitorum (the case of a foot in slight equinism and slight adduction, see fig. 729) the artificial muscle is to be worn almost constantly, during walking and even when resting at night. It is no more uncomfortable than an ordinary stocking.

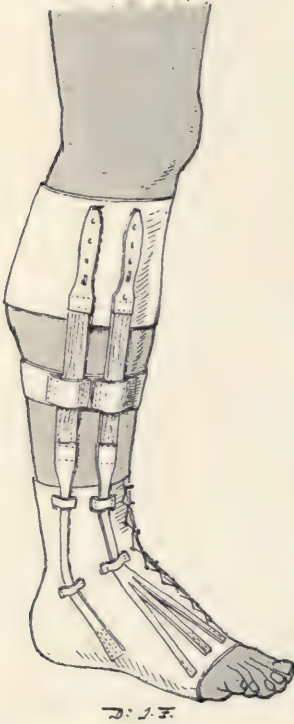


Fig. 729.—Artificial extensor communis digitorum and peroneus tertius.

Here is the **degree of tension** to give an artificial muscle: it is necessary that, when the foot is at rest, the muscle, taking the place, for instance, of the tibialis anticus, should place the foot in slight varus with flexion on the leg, that is to say, in a position rather the reverse of that which the foot has a tendency to assume. And thus, when the foot is moved, the tibialis anticus, being partly paralysed, but assisted by its artificial supplement, is doing its utmost.

If, however, you are unable to rely on the entourage of the child, or if you have not succeeded in obtaining a satisfactory result in this way, because the muscle is already too much affected, you will treat this first degree of deformity in the same way as the next one, that is to say, you will have made for the child a rigid articulated boot, the joints of which will prevent the

lateral movements and limit its extension beyond a right angle (see fig. 735).

2nd Degree of Paralytic Club-Foot.—*The paralytic club-foot is clearly and distinctly in evidence.*

One ought: 1st, to straighten it; 2nd, keep it straightened.

Straightening a Paralytic Club-Foot

One manipulates in identically the same way as for the correction of congenital club-foot (see Chap. XV.).

In "dissolving" and successively correcting the different factors of the deformity, one arrives generally, after 8 or 10 minutes, at a very satisfactory result ; but one does not stop until one has obtained a hyper-correction of at least from 15° to 20° .

I said that you would be astonished at the facility with which

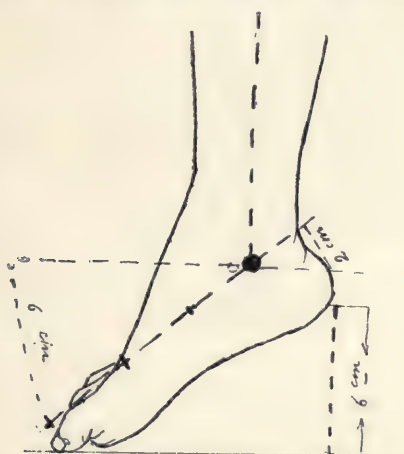


Fig. 730.—The *necessary* lengthening of the tendon is equal to a third of the distance separating the heel from the ground. Here this distance is 6 cm. The tendon must, then, be lowered by 2 cm. But as, in the child, a growth of only 1 cm. takes place after tenotomy, it is necessary in the present case to perform lengthening of the tendon and not a simple tenotomy.

the foot allows of correction. One may even correct it without anæsthesia, at two or three sittings, made at intervals of 8 days.

Nevertheless, a tenotomy is sometimes indicated in order to achieve the correction. Thus, in the case of equine club-foot: if, at the end of the sitting, the correction of the equinism be still incomplete, you feel the tendo Achillis strongly resisting; instead of tearing it away by a very considerable effort—which might be possible, strictly speaking, although you would probably

tear away some pieces of the os calcis in doing so—you may divide or elongate the tendon.

Indications for Dividing or Elongating the Tendon (fig. 730).

One ought to divide when it is merely a question of obtaining a lengthening of $1\frac{1}{4}$ cm. in a child, or of $2\frac{1}{2}$ in an adult, because nature may replace this amount of separation. But, if you ought to obtain more than that, you will perform elongation of the tendon.

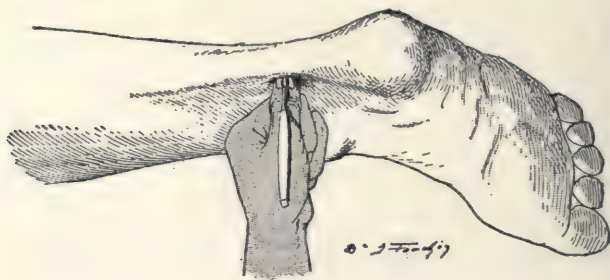


Fig. 731.—Division of the tendo Achillis. The left thumb depresses the skin under the tendon to protect the deep organs and to serve as a guide for the tenotome.

(a) Subcutaneous Section of the Tendo Achillis

Instrument: a tenotome or a narrow bistoury.

Ordinary precautions and minute asepsis.

Make the patient lie on his abdomen, so that the tendon may be easily seen and felt. Direct the assistant to flex the foot slightly, in order to throw the cord of the tendon a little into prominence.

You divide the tendon (fig. 731 and 732) two centimetres above its insertion into the os calcis, entering from within outwards so as to be quite certain of avoiding the bundle of vessels and nerves. Finally, divide the tendon from its deep to its subcutaneous surface.

1st. With your index finger or your left thumb, invaginate the skin from within outwards under the deep surface of the tendon, which is, for the moment, relaxed.

2nd. Conducting over your finger-nail the fine bistoury, flat, you puncture the skin in this fold, and thus you penetrate directly as far as the external border of the tendon.

3rd. You then remove your left index finger, and the invaginated skin returns upon itself.

4th. After that, you turn the edge of the bistoury round to attack the deep surface of the tendon.

5th. At this moment, you direct the assistant to flex the foot, more and more forcibly. The tendon in this way cuts

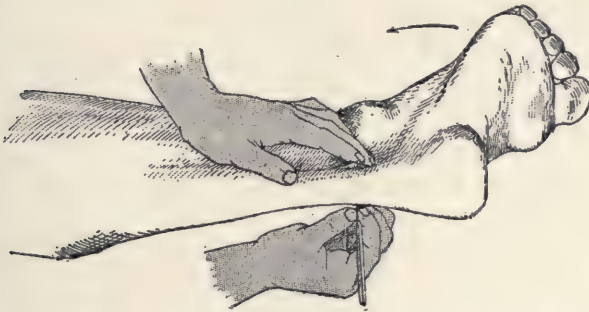


Fig. 732.—Tenotomy (*continued*). The blunt tenotome, passing under the tendon, makes a prominence beneath the skin on the outer side. The left hand fixes it in this position; an assistant makes gradual flexion of the foot, following the direction of the arrow, and the tendon cuts itself against the sharp edge.

itself against the knife's edge, gently, slowly, millimetre by millimetre, until you have reached the superficial fibres (subcutaneous). The tenotome should always be held in such a way as not to pierce the skin. For greater security, you may also raise the skin with the left index finger and thumb, whilst the section is made.

Suddenly, even before you have withdrawn the bistoury, a sharp separation of the two fragments of the tendon occurs as a general rule, or else the separation is effected by degrees.

If this does not occur when your tenotome has arrived under

the skin, you will nevertheless withdraw it, and press on the small wound with a swab, to arrest any hæmorrhage. Whilst you are pressing thus, you direct your assistant to flex the foot further with his two hands, and with a **smart** and **vigorous wrench** ("le coup du malin").

This manœuvre ruptures the fibres which have escaped the knife, and you will feel that the tendon is lax. The straightening of the foot is then obtained to the extent you wish.

You place a slightly compressive aseptic dressing over the small wound; and over all you apply a plaster which fixes the foot in a hyper-correction of from 15° to 20° ; it is thus flexed on the leg at from 70° to 80° .

(b) Elongation of the Tendo Achillis

You perform elongation by the open method, or by the **subcutaneous route**, in the very simple manner you see here (fig. 733 and 734).

1st. You introduce a fine bistoury over the median line of the tendon and at about 6 or 7 cm. above its inferior attachment. Then you divide its **internal half** from within outwards.

2nd. Then you remove the bistoury and re-introduce it further downwards at a centimetre and a half above the attachment of the tendon; you enter in the median line and divide, this time, the **external half** of the tendon, from without inwards.

3rd. This done, you **gently raise** the point of the foot and you **feel**, as it is straightening, the **two halves** of the tendon **glide gently** one over the other until you reach the extent of the elongation desired.

If you have never performed elongation, try, for the first time, the open method. In the operation by the open method, one unites by a longitudinal median incision the two transverse incisions. One sutures afterwards the extremities of the two small tendinous tongues remaining with catgut, then the skin with catgut in the same way.

One fixes the correction in a plaster (as after tenotomy).

The plaster is left in position for three or four months. But, with the plaster, the child will be able to walk when the foot is no longer sensitive, that is, 6 or 8 days after the correction.

At the end of the four months, the plaster is removed and the foot set free.

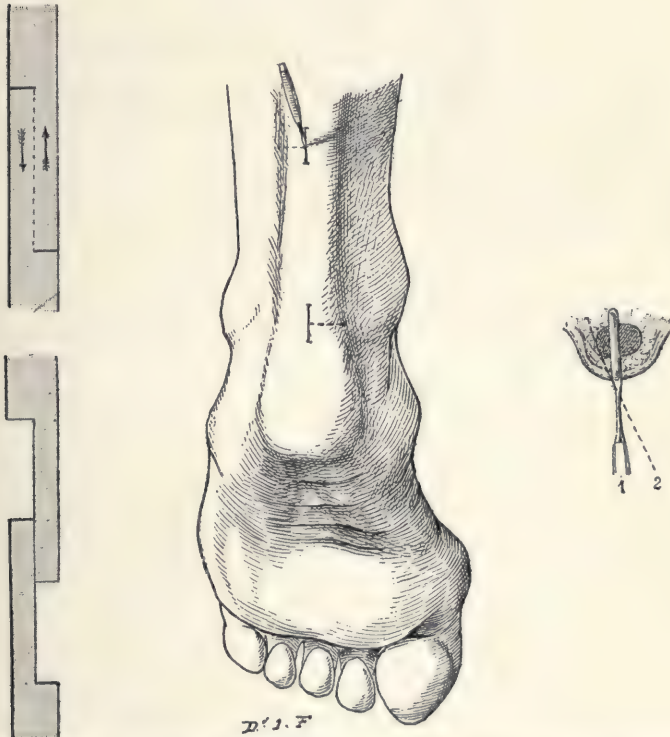


Fig. 733-734.—Method of performing elongation of the tendo Achillis (see the text).

Preservation of the Correction

The foot is corrected and even over-corrected for the moment. What remains to be done? That depends on what is going to happen.

(a) It happens, in some **favourable cases** of club-foot,

that the foot **remains straight**¹ after leaving off the plaster and without taking any further precaution.

As long as the deformity existed, the stretched muscles were unable to do anything, for their action was wasted in wrestling (ineffectively, however) against the deformity. When this is corrected, or even slightly over-corrected, and when, besides, the points of attachment of the muscles are approximated, the **action of the muscles may return sufficiently** to balance their **antagonists** which are on the **contrary rather the weaker**, having been elongated by over-correction.

To improve their condition, you massage the muscles, formerly stretched, now contracted, you electrise them, you make them perform active movements.

Improve them still more if need be with an artificial muscle, which, insufficient before the correction, may not be so now.

(b) But, **most often**, you will find that this treatment is **not sufficient**; it will not prevent the foot returning to its bad position, because after, as before the operation, the groups of muscular antagonists will remain very unequal.² After a few days or a few weeks have elapsed since the plaster was left off, if you see that, in spite of massage and of the artificial muscle, the correction obtained is not preserved, if the foot resumes its old direction, make haste and recapture it. Correct it immediately, which this time is quite easy, and take a mould in the good position, in order to have a **jointed boot** made, which boot will prevent side movement and extension beyond a right

¹ In the case where the antagonistic muscles are almost equally strong, and where the deformity is only produced because the posterior muscular group has returned more quickly to life than the anterior, after the attack of infantile paralysis.

² It was on account of these inconveniences, produced by the inequality of the different groups of muscles, that Duchenne (of Boulogne) said: "It would be better to lose all the muscles of the foot than one only of the most important of those muscles."

But we shall see further on that, for those who wish and know how to perform tendon transplantations, it is no longer true, and that the result of operation will be the more beautiful according as the foot has lost fewer of its muscles.

angle (fig. 735). The mould removed, you fix the foot in the right position by a small plaster, which you leave on for the time necessary for making the boot.

With this boot, I dare not say that the lameness will entirely disappear, but it will at least be greatly diminished.

Take note that this boot may be **easily made anywhere**, at a price which will certainly not exceed the resources of the most humble, seeing that it is sufficient to take two metallic shanks with a joint with limited play, and to make an ordinary boot on this armature. In other words, you have only to place in the interior of an ordinary boot the appropriate armature; to **clothe** with leather this kind of metallic stirrup.

If there is shortening, one orders a heel-piece (see p. 477, the boots for coxitis).

It is necessary to say that boots articulated or rigid are not always well borne,¹ and that by the always predominating action of the sound muscles, it is possible for abnormal pressure to be produced on certain points, setting up callosities or even excoriations.

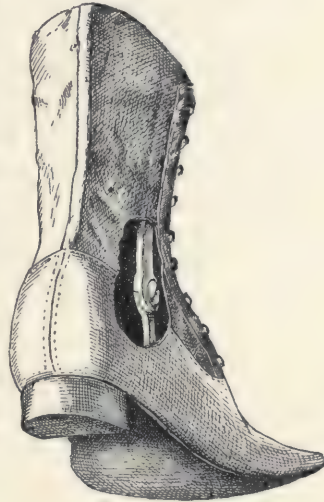


Fig. 735.—Articulated boot permitting flexion only within or beyond a right angle (according to the case).

B.—Paralysis occurring about the Knee or about the Hip

If one is dealing with another segment of the limb than the foot, namely, with the knee or the hip, one can distinguish three varieties on all fours with the preceding cases, and the course to follow is evident, after what we have said with reference to the foot.

¹ See Note 2 at the bottom of the preceding page.

1ST VARIETY.—If there is *almost no paresis*, and *no deformity whatever*, one endeavours simply to strengthen the affected part : massage, electrification, baths, etc.

2ND VARIETY.—*The articulation is flail-like*.—If it is the knee, you will prepare a rigid knee support in celluloid reaching from the trochanter to the malleoli ; if it is the hip, the small apparatus for coxitis (see p. 417).

It is most advantageous, in these two cases, to cause the patient to wear a large apparatus (from the waist to the toes) ; rigid at the knee and articulated at the hip and the foot, if the knee only is affected ; articulated at the knee and rigid at the hip, if it is the latter which is affected.

The **apparatus** should be as light as possible, **in celluloid**.

3RD VARIETY.—(a) If the *deformity is scarcely visible*, and if one muscle only is affected, one has *recourse* to an artificial muscle, although its use here is less convenient than in the foot. It is more difficult to attach it to a pair of drawers than to a gaiter.

(b) If the *deformity is evident*, one performs a correction, or, rather, a hyper-correction, in the way described for the deformity in coxitis or in white swelling of the knee (Chap. VI. and VII.).

At the knee, division of the contracted tendons of the ham-strings will sometimes, but very rarely, be indicated.

Section of the Tendons in the Popliteal Space

In reality, in order to correct a deformity of the knee which is affected with infantile paralysis or tuberculosis, **orthopædic manipulations alone will nearly always be sufficient**.

Personally, it has not happened to me to divide the hamstring tendons, on an average, once a year.

You know, in any case, that it is easy, simple, and harmless, to divide them either by the open method or *subcutaneously*.

For the muscles on the inner margin of the popliteal space this is evident, but it is equally true for the biceps, in spite of its being so near the external popliteal nerve.

One does not find these relations clearly set forth in books on anatomy. Here they are (fig. 736) from my own dissections.

At its insertion the biceps is composed of **two parts: one external, rounded into a tendinous cord, hard and slippery under the finger**: the other, **internal, fleshy**, spread flat and uniting with the preceding cord like *the barbs of a bird's feather to the quill*.

The nerve is found in contact with the internal fleshy part and is always separated from the tendon itself by a distance of nearly 2 cm.

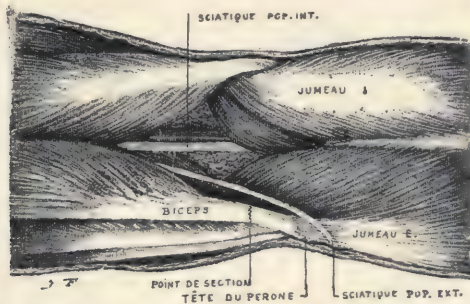


Fig. 736.—(See the text.) The external popliteal nerve is in intimate relation with the *fleshy* barbs which unite with the tendinous cord, but not with the latter, from which it is separated by more than a *centimetre and a half*. With the tip of the index finger, one easily feels, even through the clothing, especially with the knee slightly flexed:—(1) the tendon; (2) at two centimetres inside it, on a level with the interline, the more slender, softer, more movable cord of the external popliteal nerve.

So that, by carrying the tenotome against the **internal border of the tendon**, parallel to it, in the space between the tendon and the fleshy part, one is sure to avoid the nerve.

Technique of Tenotomy of the Hamstrings

1. Place the left index finger flat upon the tendinous cord.
2. You press over the internal surface of the tendon in order to cause it to glide gently outwards (fig. 737) **like a ball**: owing to this gliding, the nail of the index finger corresponds to the inner border of the tendon with which it keeps in contact.
3. Over the back of the finger nail (fig. 738) you conduct the tenotome, the blunt edge inwards, the cutting edge outwards.

4. Inclining the handle slightly backwards and inwards (at an angle of about 15°), you pierce and penetrate for 2 or 3 centimetres.

5. Cut the tendinous cord slowly, from within outwards, and from the depth to the surface. With the index finger and the thumb of the left hand, you raise the skin in order that it may not be wounded by the tenotome.

The division of the tendon being made, **one is not concerned at all with the internal fleshy portion.** One withdraws the

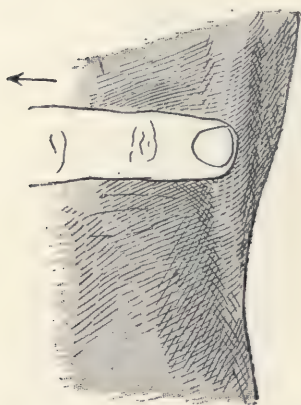


Fig. 737.—One presses on the tendon of the biceps, then, moving the finger slightly inwards, the tendon glides outwards, *without losing contact with it.*

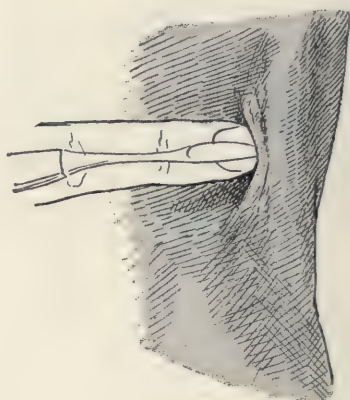


Fig. 738.—Then one conducts the fine bistoury on the finger nail, nearly level with the internal border of the tendinous cord: one is always sure of avoiding the nerve. Then one cuts from within outwards and from the depth to the surface.

tenotome and places a pad over the opening. One compresses, and directs the assistant to extend gradually and slowly the leg which has been bent back. **By this movement of extension, the fleshy fibres stretch themselves out, then they are broken** (as in torticollis [see Chap. XVI.], the fibres which escape the bistoury give way).

One cuts the tendon **3 centimetres above the interline** of the knee.

The tendon, and also the nerve, are felt very distinctly and

easily¹ at the external part of the popliteal space, through the clothing; practise making this palpation on yourself, **the leg semi-flexed**. One feels them especially easily when the biceps is contracted, the knee flexed.

You see how this technique is carried out and without danger to the nerve; that is why I recommend subcutaneous tenotomy to you rather than open tenotomy which necessitates a long incision; and the wound which gapes during the manipulations of the correction may, perhaps, become infected, so that this tenotomy, the open one, is on the whole less simple and harmless than the other.

On the inner side of the popliteal space, subcutaneous section of the tendons is easy.

It also is done 3 cm. above the interline. The technique is identical with the preceding one. The tenotome, resting on the nail, is carried close to the external side of the first tendon, the Semi-membranosus. Divide it, then the Semi-tendinosus and the tendon of the Gracilis, and, lastly, if need be, divide also the Sartorius tendon.

The correction is maintained by a plaster worn for 4 or 5 months. Sometimes it is spontaneously preserved after the removal of the plaster. Should it not be so, you would make a stiff knee-piece.

C.—The Whole of the Lower Limb is Affected, or even Both Lower Limbs are Affected

Only the large celluloid apparatus can be of any use here; the apparatus takes its support from the ischium and *the patient walks like a man whose thigh has been amputated*.

Your part consists in straightening the legs in one or several sittings, with or without tenotomy, with or without anæsthesia, according to the case; then, when the legs are straight, quickly take a mould of them and fix at once the correction in a plaster for 4 or 5 weeks, the time required by the orthopædist to construct the celluloid apparatus.

¹ Palpate at one or two centimetres below the interline, close to the fibula. You will easily find the nerve against the bone, and you will easily be able to follow it from below upwards.

D.—Paralytic Scoliosis

This is treated by the same methods which serve for Scoliosis in the Adolescent, with this difference, that in Paralytic Scoliosis, patients ought to wear a celluloid corset.

E.—Paralysis of the Upper Limb

You will act in the same way as for infantile paralysis of the lower limb.

It is possible to make an artificial muscle to do duty for the extensor of the fingers, etc.

II.—THE SURGICAL TREATMENT OF INFANTILE PARALYSIS

After having dealt with purely Orthopædic treatment, we will now deal with the Surgical treatment, and will afterwards discuss the part played by each of these procedures.

If the objection is raised that such treatment comes within the domain of the surgeon specialist only, I will reply: you ought at least to know what the specialist can do so as to be able to guide and advise your patients.

You will encounter one or another of these three conditions:—

1. The muscles are shortened.
2. The muscles are abnormally lengthened.
3. The muscles are paralysed.

1ST CASE.—*The shortening of a muscle or of a tendon, for example, the tendo Achillis.*

We have already mentioned, on p. 680, that the tendo Achillis may be lengthened by dividing it, or by subcutaneous folding, and this is so simple and benign a procedure that it hardly deserves the name of operation.

2ND CASE.—*The elongation and stretching of one or of several muscles:* The elongated muscles are weakened and paretic (but not paralysed in the case under consideration here), that is

to say, they still contract voluntarily and react to electricity. This condition is often noticed in the three anterior muscles of the leg, which become unable to effectively struggle against the force of gravity, which leads to displacement of the foot, and a persistent equinism.

What happens now? Left to themselves the muscles lose

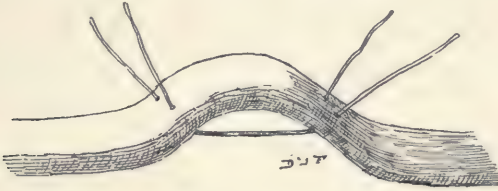


Fig. 739.—The shortening of a tendon (Vulpinus).

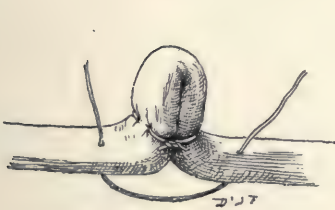


Fig. 740.



Fig. 741.

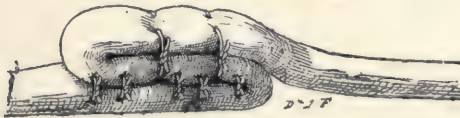


Fig. 742.

Fig. 739, 740, 741, 742.—Different methods of shortening tendons.

what remains of their activity in the unequal fight; but if they are shortened in order to produce a slight hyper-correction (the foot being flexed at an angle of 80°) they will, on the contrary, by the approximation of their insertions, recover sufficient strength to maintain this correction, and will even develop several useful movements of extension—which points out the **treatment**.

The shortening of elongated muscles is effected by folding

or gathering up the tendons, as shown in fig. 739 to 744, or, by removing a segment of the tendon and suturing the cut ends together or, by the excision of a lozenge-shaped portion from the width of the tendon, which is only possible in very large tendons such as the tendo Achillis. Instead of shortening the tendon it is even simpler to shorten its cutaneous covering by raising a lozenge-shaped portion of skin at a point corresponding with the affected tendon or tendons, then bringing together the opposed edges of the wound by sutures (this is the method of my friend, Sir R. Jones, of Liverpool).



Fig. 743.—Shortening by gathering (Lange).



Fig. 744.—Shortening by gathering.

3RD CASE.—*Complete Paralysis* of all the muscles of a segment of the limb ; *here the articulation is limp.*

Treatment.—After having straightened the limb if necessary, the articulation must be made rigid ; this is effected by the fusion of the articular surfaces, after refreshing them, that is to say, after scoring the cartilages—and this is *Arthrodesis*.

The Technique of Arthrodesis.—Let us take for the type of our description, arthrodesis of the ankle-joint. An Esmarch bandage is applied and is not removed until the suture of the skin is completed.

Incision.—In the ordinary way a slightly curved incision is made, as shown in the diagram, fig. 745, following the outline of the external malleolus, an almost horizontal incision, passing from the outer edge of the tendo Achillis to the median line in

front. This has the advantage of giving plenty of room and allows of the easy and complete luxation of the foot inwards, so that the internal surfaces of the articulation can be as readily reached as the others. But this transverse incision may compromise the vitality of the skin when the region is badly nourished; more than that, the incision only exposes the tibio-tarsal articulation. And that is why I generally prefer and advise an external incision which, beginning two finger-breadths above the external malleolus, descends vertically to the calcaneo-astragaloid articulation, then turns from behind forwards to the tubercle of the cuboid bone. This incision does not expose as much of the



Fig. 745.—Incision for arthrodesis of the ankle.

tibio-tarsal articulation as the preceding method it is true, but, nevertheless, it gives us sufficient room to lay the joint open and allows of our operating on its upper and external surfaces, and it has an advantage over the first described incision¹ in that it exposes the external calcaneo-astragaloid articulation and the external portion of the medio-tarsal joint. But, in the case of a lax ankle-joint, one has nearly always to operate upon the two last articulations at the same time as upon the tibio-tarsal, for, if its partial ankylosis prevents flexion and extension, it does not prevent the lateral movements of the foot.

¹ In leaving untouched the internal surfaces one avoids the traumatism which leads to complete luxation of the foot.

It is impossible to correct the valgus or the varus which generally exists, as well as the rolling upon itself or twisting of the foot, without operating upon the astragalo-calcanean and middle tarsal articulations.

After the cutaneous incision one cuts across the peronei muscles behind the point of the external malleolus. It is advisable to trim the four ends of the tendons, which at the end of the operation should be fixed to the remains of the insertions of the ligaments or to the periosteum or to the bones.

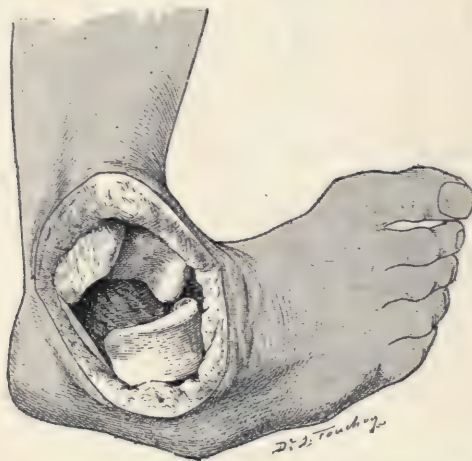


Fig. 746.—Arthrodesis of the ankle. Luxation of the foot inwards and exposure of the articulation.

Afterwards the tibio-tarsal ligaments are divided outside and a little in front and behind.

The articulation is now exposed. By pressing the foot very firmly inwards the upper and external surfaces of the articulation are made accessible. They are then refreshed by means of a curette or a chisel.

The refreshing process need not be very minute. It is sufficient to "peel" the cartilage and to scratch several furrows about 2 or 3 millimetres in depth into the denuded surfaces of

the bones. The parts are then cleansed by carefully removing all débris and chips of cartilage, instead of leaving them in the wound as advised by some surgeons.

After that one passes on to the external calcaneo-astragaloid and calcaneo-cuboid articulations, which are likewise very easily refreshed by scraping *twice* with a chisel. If a certain degree of varus exists (which is usual), instead of simply refreshing the surface of the articulations, a small portion of bone on the outer side is removed in order to fix the foot in complete correction, or, better still, in hyper-correction.

Here, again, in order to avoid interference with the nutrition of the region no further disturbance inwards is made, and the astragalo-scapoid side of the medio-tarsal joint is disregarded.

But it is obvious that if you wished to reach these internal articulations nothing could be easier, either by two transverse incisions branching from the external incision, or by approaching them directly by an independent incision on the inner side, proceeding from the internal malleolus up to the first cuneiform bone. The eroded surfaces are cleansed and the operation is completed by stitching the ends of the peroneal tendons to the periosteum, or, better still, to the ligaments of the inferior peroneo-tibial articulation. The suture may be with catgut or with Michel's clips, according to choice. Ordinary dressings and a plaster apparatus in the position of slight valgus, that is to say, of hyper-correction, and of extension of the foot, if there is, as is the rule, a little shortening to compensate, the degree of extension being calculated upon the amount of shortening.

Keep the plaster apparatus on for four or five months.

The Result.—There is occasionally complete ankylosis (in about half the cases), sometimes an ankylosis almost complete, that is to say, a fibrous ankylosis, which is still satisfactory ¹

¹ It is only rarely that the operation results in complete and immediate fixation and then only when it has been well done and in subjects more than ten years of age, which is the age at which it ought to be done. In the case of very small children one has recourse to artificial ligaments made of silk rather than to arthrodesis.

and even in some respects more advantageous than a bony ankylosis, since fibrous ankylosis leaves the foot slightly supple; this would be a perfect condition if it were not that there would remain a tendency to subsequent relaxation of the fibrous bands, which would detract from the result originally obtained.

When the plaster has been removed, if the joint appears to

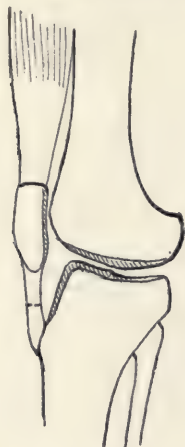


Fig. 747.—Arthrodesis of the knee. The articular surfaces of the femur, the tibia, and the patella have been refreshed and the ligamentum patellæ divided in order to shorten it.



Fig. 747a.—Showing the refreshed surfaces in contact. Shortening of the ligamentum patellæ.

be insufficiently fixed, you will again immobilise with a new plaster apparatus to be worn for three months, after which one of celluloid should be worn for several months longer. Note that with the plaster and the celluloid the patient will be able to come and go without the apparatus being noticeable.

Arthrodesis of the Knee

The articulation is opened either by the classical curved incision for resection, or by two parallel incisions on either side of the patella.

In reality, what has to be done is to make a very sparing resection. Always preserve the patella which you will refresh later on, and divide the tendons in the popliteal space to prevent the occurrence of flexion of the joint at a later period. A slight buttress should be left on the articular surface of the tibia so that it may be subsequently fitted in between the condyles of the femur. Then, with a curette or a scalpel, refresh the surface of the patella, and the opposite surface of the femur (fig. 747).



Fig. 748.—Arthrodesis of the knee. The joint opened.



Fig. 748a.—The tibia is already denuded of its cartilage. The curette is engaging the cartilage of the condyles of the femur.

Stitch together all remains of ligaments to complete the fixation. Close the wound and immobilise the joint in a plaster which will be left in position for from four to six months. After removing the plaster, bony ankylosis will always be found; in order to promote this and achieve it, if found necessary, a celluloid apparatus for the knee should be ordered, and worn for from four to six months.

Arthrodesis of the hip is performed in the same way as resection (see the technique of this in the chapter on Coxitis). Arthrodesis here is a fairly grave operation and is happily only seldom indicated; it is even altogether condemned by a large number of orthopædic surgeons.

Arthrodesis of the shoulder when the joint is flail-like—only when the muscles of the arm and forearm are intact (fig. 750 to 752).



Fig. 749.—Suture of the tendon.

An anterior incision to open the articulation, luxation of the head of the humerus, which must be refreshed over the whole of its articular surface, together with that of the glenoid cavity. Besides that, it is well to fix the head of the humerus to the coracoid process and to the acromion, by means of two silver sutures. The arm is afterwards immobilised in a plaster in an abduction of 90° , the plaster being left on for three or four months.

In this way one obtains osseous ankylosis of the scapula and humerus. From that time the elevator muscles of the scapula can raise the arm, and the patient finds himself able to carry his hand to his mouth and over his head, that is to say, arthrodesis of the shoulder generally gives very excellent results, with which those most interested are very satisfied.

As to arthrodesis of the **elbow** and **wrist**, also easy to carry out—it is scarcely ever indicated. Sir R. Jones always substitutes for it the removal of a lozenge-shaped portion of skin, in front for the elbow, behind for the wrist.

AN ALTERNATIVE FOR ARTHRODESIS—ARTIFICIAL LIGAMENTS

Three objections can be made to Arthrodesis.

(a) The extensive opening up of the articulation which it entails.

(b) It is useless, or almost useless, below from eight to ten years of age (up to that age one rarely obtains a sufficiently firm ankylosis); (c) and when that has been completely obtained (osseous ankylosis) it in itself implies the entire and definite



Fig. 750.—Arthrodesis of the shoulder. Incision.



Fig. 751.—Arthrodesis of the shoulder (continued).

loss of function of the joint (which leads one to remark that it succeeds too well, or not sufficiently).

And it is for this reason that an attempt has been made to substitute for arthrodesis artificial ligaments¹ (of silk or of horse-hair) bracing together the two epiphyses and having none of the

¹ *Ligament* is a bad word, seeing that what one calls a ligament allows the bony levers the full extent of their normal play. One ought to say *reins* or *curbs*.

inconveniences mentioned above, because: (a) they do not necessitate the opening of the joint; (b) they are applicable to children of the most tender years, and, lastly, (c) they do not suppress the play of the joint, neither totally nor permanently, because one can always at any given moment, if one so desires, set the joint at liberty by releasing the artificial ligaments, which patients have sometimes demanded after several years, as we shall see. Lastly, we can enhance, if need be, the effect



Fig. 752.—Arthrodesis of the shoulder (*continued*). The humerus coracoid and acromion wired together.

produced by the first operation with artificial ligaments by introducing additional threads between the epiphyses.

There are two varieties of artificial ligaments; in the first, the artificial ligament, like the natural ligaments, is in apposition in its whole length with the outer surface of the bone, its extremities being attached to two bones by means of the periosteum, or they pass along in a shallow canal, transverse or longitudinal, made by a bradawl in each of the two bones, or, again, fixed to the bones by nails with very large flat heads.

In the second variety, the artificial ligaments form in their

entire length a loop, one strand of which is placed deeply, intra-osseous, the other superficially, extra-osseous, or subcutaneous.

In order to adjust ligaments of the second variety a curved bradawl is used, with a hole near its point (so that a strong silk thread, doubled, can be passed through it, which thread will become the artificial ligament). This instrument is furnished with a handle and being forcibly pushed, penetrates one of the epiphyses at a point situated at from 3 to 4 centimetres above (or below, according as we commence on the upper or the lower epiphysis); the bradawl thus penetrates up to the centre of the epiphysis, the axis of which it pretty nearly follows towards the middle of its articular surface, where it then enters the other epiphysis (on its articular surface) so that it makes its exit at from 3 to 4 centimetres beyond the articular surface on the external aspect of the second bone.

At this point a small incision a centimetre in length is made through the skin to allow of the point of the bradawl to be brought out and the doubled silk passed through the eye; on withdrawing the bradawl the deep strand of the silk loop is left in position; the other strand is then picked up by means of a probe and is either passed beneath the skin or placed deep down against the external surface of the bones, becoming the superficial section of our artificial ligament, and after having given to the joint a position of hyper-correction, the two free ends of the thread are tied together in order to close and complete the loop—taking care that it effectually maintains the degree of hyper-correction desired.

The knot is hidden under the integument by gently drawing it away as far as possible from the small incision previously made.

Thus the operation may be called subcutaneous; it could also be performed easily enough and more conveniently by the open method, but there would be some slight risk of infection of the thread.

Sometimes the deep strand of the loop will pass through not merely the two bones, but three or four bones; for example,

it is possible to go from the epiphysis of the tibia to the first cuneiform bone; it is possible also to make the deep strand of the loop, instead of traversing all the intermediate bones, to ride over their external surface and so cause it to be partially buried amongst the outermost bones when they are drawn together by tying the two extremities of the thread.

The technique of adjusting the artificial ligaments of the first variety may be divined. The extremities of the silk thread is stitched to the periosteum, or to the attachments of the existing ligaments or to the fascia. Thus they can be fixed to the bones by flat-headed nails or by passing them through curved passages in the bone made transversely with a curved bradawl.

One can also construct ligaments of the first variety without having recourse to anything foreign, such as a thread, by utilising for the purpose the tendons of the paralysed muscles themselves.

Ignoring the fibro-fatty mass which represents the belly of the degenerated muscles, their tendons are fixed either to the periosteum, or to the aponeuroses—tenodesis, fasciodesis; or, better still, in slight furrows grooved in the bone; detached fragments of bone may be beaten down over the furrows so as to seal up the tendons.

Ligaments of the second variety—those traversing the bones—give somewhat more security than the first.

Which is to be preferred? Artificial ligaments or arthrodesis? There are some surgeons, for instance, Jones, who extol arthrodesis; there are others, such as Lovett and Bartow, who prefer, under all circumstances, artificial ligaments. We are among the eclectics, employing sometimes one method, sometimes the other, in all young patients (under twelve years) the ligaments, above that age, arthrodesis.

One cannot yet pass a definite judgment upon the value and the future of this method of treatment by artificial ligaments, on which the last word has not been said, but it is, we are convinced, destined to take a very important place (in the

treatment of Infantile Paralysis) as soon as its technique has been perfected, especially as regards increasing the number of threads.

4TH CASE.—**Paralysis**, not of all the muscles in a region, but of **one only** or of **several**.

Owing to the disturbance of equilibrium of the muscles a deformity is produced. One begins by straightening this (in the manner set out in the orthopædic treatment) at the first sitting if the deformity is only slightly marked, but only at the expiration of two months (the patient being in plaster during this time) if the deformity is very much in evidence ; one will then

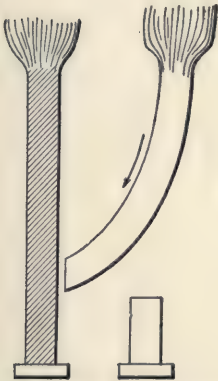


Fig. 753.—Total transplantation.

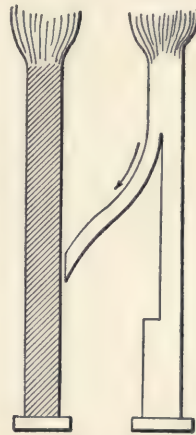


Fig. 754.—Partial transplantation.

carry out a muscle grafting in order definitely to re-establish the muscular equilibrium in the parts affected.

In reality, this is not an actual grafting of a sound muscle on to a paralysed one, but the replacing of a paralysed muscle by a sound one put in its place. Formerly, it is true, one fixed the tendon of the sound muscle to the tendon of the paralysed one, but to-day the tendon of the sound muscle is fixed directly to the periosteum, or to the bone opposite to, or as near as possible to, the insertion of the paralysed muscle.

Formerly, therefore, it was a real grafting (fig. 753 and 754).

To-day, however, it is not only a part of a muscle, but the entire muscle which is transplanted (total transplantation in place of partial transplantation).

The sound muscle, which serves as the graft, is some neighbouring muscle or one at a distance, it may be one of the same action as that to be replaced, or, on the contrary, an antagonist. For example, the tibialis anticus may be replaced by one of the peronei, in which case one kills two birds with one stone by strengthening the too feeble group and enfeebling the too powerful group of muscles, at one and the same time.

Before proceeding to perform a muscle graft or transplantation it is the duty of the surgeon to lay down a definite plan of operation, and to do that he must study beforehand which muscles are paralysed and which are sound. This is easily arrived at by electrical examination and, better still, by the simple direct observation of the voluntary movements of the part; inspection and palpation will enable one to see if each muscle contracts normally (always comparing it with the corresponding muscle on the other side).

The Technique of Muscle-grafting or Transplantation

Perfect asepsis is the condition essential to success (mask, gloves, etc.). An Esmarch bandage is necessary. One usually adopts a fairly extensive longitudinal incision in order to lay bare both the sound and paralysed tendons and expose the corresponding bellies of the muscles, which gives one the opportunity of ascertaining the condition of their vitality; it is sufficient to observe their coloration.

There is quite a gamut of colours ranging from a bright red to a dull whitish tint. Bright red indicates a normal condition of the muscle, a pink colour denotes a commencing alteration in its fibres, whilst a greasy yellow or waxy white shows that the muscle is dead.

Against **very long incisions**, extending from the belly of a muscle to its insertion, it may be said that extensive operation wounds **facilitate infection**. It would be better, then, only to make small incisions of 3, 4, or 5 centimetres in length; one carefully considers this before using the scalpel. It is the usual practice to do this. One knows beforehand by electrical and clinical examination which muscle is completely paralysed and which is quite sound. For example, if we wish to replace the tibialis anticus by the peroneus longus, as will be explained farther on, we make, instead of two very long incisions of 20 or 25 centimetres reaching from their lower insertions to halfway up the leg, three *very small incisions* of scarcely 4 centimetres: the first opposite the cuboid bone, to expose and divide the tendon of the peroneus longus; a second at the lower third of the leg in order to pull on the upper end and withdraw it from the sheath, the third opposite the insertion of the tibialis anticus in order to attach it (by means of a subcutaneous tunnel)¹ to the liberated peroneus longus.

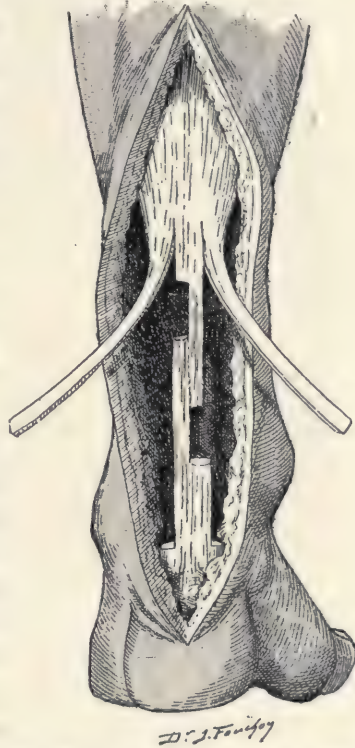


Fig. 755.—The tendo Achillis lengthened and two lateral strips detached in order to transplant them on to the anterior tendons on either side.

In a general way, one will divide the sound tendon as nearly

¹ Or, better still, in order to avoid adhesions, and after the method of some surgeons, the sound muscle is made to pass through the sheath of the paralysed muscle which has previously been emptied.

as possible to its insertion in order to preserve its maximum length. If it is still too short to reach up to the insertion of the paralysed tendon, one lengthens the sound tendon. For this lengthening and for suturing the tendons one uses silk, or catgut, or Florence horse-hair.

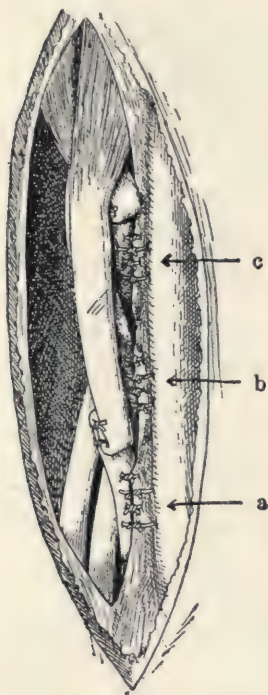


Fig. 756.—At the points where they are sutured to the superficial aponeurosis, one also sees that the three tendons have been previously shortened by plaiting: (a) tibialis anticus; (b) extensor proprius; (c) extensor communis.

The silk is boiled for half an hour in a solution of oxycyanide of mercury. Instead of silk we prefer catgut—No. 1 or No. 2.

The Advantages of Catgut.—

It is fairly easy to sterilise, and if, by some extraordinary accident, the wound has become infected, it will not be long in disappearing by spontaneous absorption (say, at the end of four or five weeks if No. 1 or No. 2 catgut has been used), whilst silk will require several months for its absorption, if that ever happens, and if one is not obliged to re-open the wound, which not infrequently becomes necessary. On the other hand, catgut is eliminated only after several weeks, by which time the adhesions formed by the grafted tissues have had time to become well consolidated.

The sound tendon is conducted by the shortest route to its new attachment; if that is situated very far from its insertion, it will be necessary to tunnel through the intervening soft parts, which is done by means of a long and fine forceps, which seizes gently the extremity of the tendon and conducts it, as a rule, into the subcutaneous fascia. We have already mentioned the cases

where it may be passed through the sheath of the paralysed tendon (previously emptied).

The sound tendon is inserted into the periosteum or to the bone with catgut or with a nail (occasionally it is lodged in a small hollow made in the bone). One may again (and it is easier) suture it to the paralysed tendon provided that it is very near, at a point 1 to 2 centimetres from its insertion into the bone; the sound tendon will pass through by one or two button-holes in the paralysed tendon. By thus inserting the sound tendon into the paralysed one at about 1 or 2 centimetres from its insertion, one avoids the inconvenience attached to suturing tendon to tendon, namely, stretching of the tissue later on; but, in any case, the stretching would be only slight and negligible, whereas it would become considerable if one sutured the sound tendon to



Fig. 757.—Passage of the tendon through the button-hole.

the upper or middle and very extensible part of the paralysed and degenerated tendon, which would bring about, as you can readily understand, the slackening and impotence of the grafted muscle.

In fact, it is essential that the muscle should be sutured in tension (therefore in slight hyper-correction of the affected region) and remain tense, in order to ensure its maximum power.

The suture of the tendons being finished, one attends to the toilette of the wound; one protects the deep sutures by several fine superficial sutures of catgut, and one passes on to the union of the skin, for which one will, in the same way, use catgut if one wishes to apply a plaster apparatus to the patient; whilst if one prefers to apply a plaster for only ten or twelve days after the operation (which is practically immaterial), one may suture the skin with Florence horse-hair or Michel's clips.

After the transplantation and the plaster apparatus, rest in



Fig. 758.—Esmarch's bandage in position; below, the two incisions, internal and external.

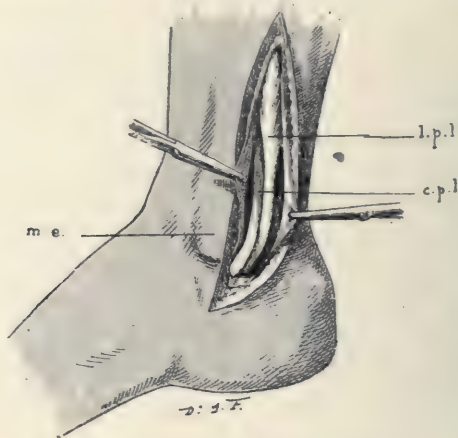


Fig. 759.—Exposure of the peroneus longus.

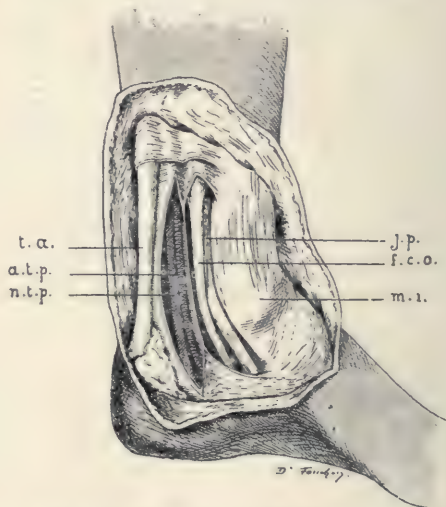


Fig. 760.—Relations of the tendons at the inner side of the ankle.

bed for a month or six weeks. The plaster will be removed at

the eighth or ninth week, but a celluloid apparatus will be worn for two months longer; during this time the removable apparatus will allow of daily exercise of the transplanted muscles.

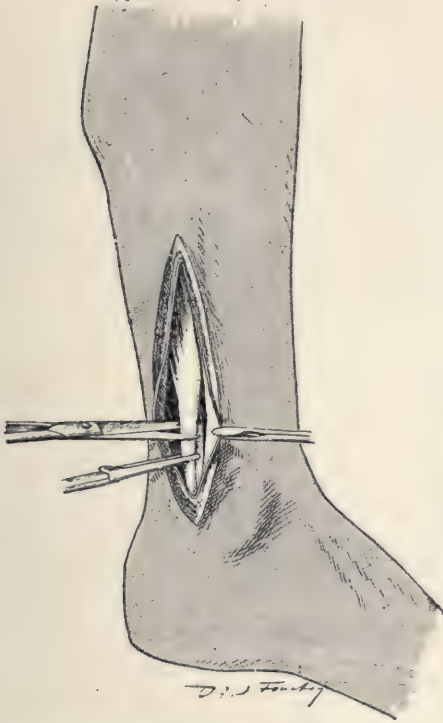


Fig. 761.—The peroneus is divided 2 or 3 cm. above the forceps; this was our old technique, now we divide it lower down (see the text).

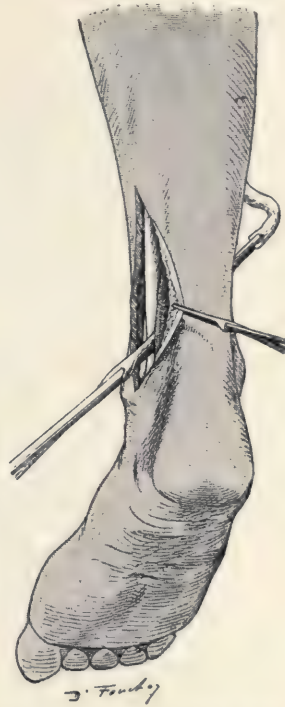


Fig. 762.—A long forceps is introduced into the wound on the inner side, and passing obliquely close to the bone, seizes the end of the peroneus longus.

massage, electrification, baths (hot sea-water baths), gymnastics, etc.

We will give only a few examples of transplantation. You will yourselves apply the principles, the general indications, and the technique to each particular case.

I.—Transplantation of the Extensor Proprius Hallucis

It is generally grafted at three different points: (a) over the upper part (dorsal aspect) of the head of the first metatarsal bone; (b) over the lower part (plantar aspect) of the head; (c) to the insertion of the tibialis anticus, to replace that muscle.

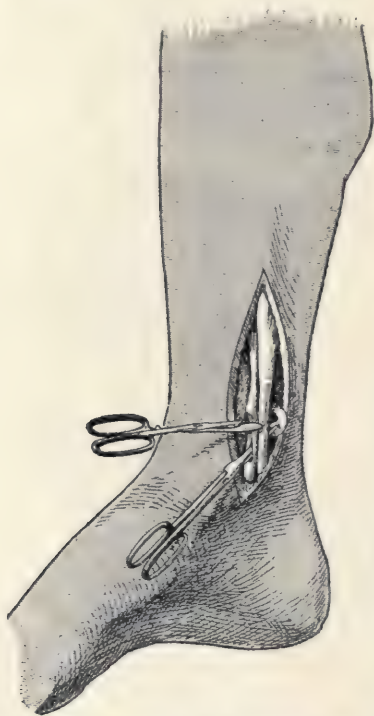


Fig. 763.—One forceps is drawing the tibialis posticus upwards, while a second is about to draw the peroneus through the button-hole.

The extensor proprius Hallucis serves very often for grafting, as it is nearly always healthy. You are aware of the *deformity* in *dorsal subluxation* of the great toe produced by the predominance and consecutive retraction of the extensor proprius. The head of the metatarsal bone produces a great projection on the border of the sole.

Already the division of the tendon acts against this deformity, but its *transplantation* will act still better; if we insert the tendon into the sloping head of the first metatarsal:—firstly, the great toe will not be elevated, and, secondly, the head of the metatarsal bone will be raised towards the dorsal surface.

How is the extensor tendon grafted on to the head of the metatarsal bone?

There are two methods:

(a) The first is by making the tendon traverse a tunnel bored

from above downwards in the bone with a small trephine or some kind of small perforator, and fixing the tendon on the *plantar* surface.

(b) The second is more simple and allows one to avoid boring the tunnel, and is done by simply fixing the tendon to the dorsal

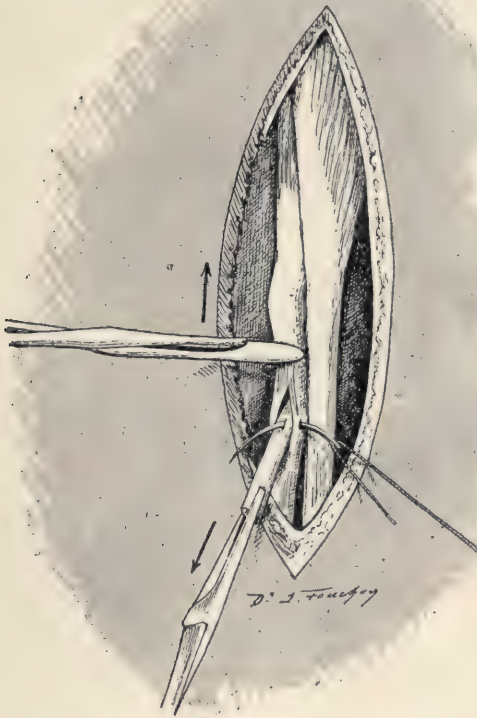


Fig. 764.—Suture of the two tendons.

surface of the bone, fastening it not only to the periosteum, but also to the dorsal ligaments of the first metatarso-phalangeal articulation.

As a general rule, in the case of paralysis of the *tibialis anticus*, it would be more advantageous to replace the *tibialis* by one of

the peronei, since by this operation the antagonists of the tibialis are markedly weakened, and consequently one has a better chance of balancing the muscular forces of the foot (the extensor tendon being at the same time grafted on to the head of the metatarsal bone as already described).



Fig. 768.—The end of the operation performed for the condition shown in Fig. 769. Suture of the tibialis posticus.

Grafting of one of the peronei to replace the tibialis anticus is indicated in cases of valgus.

The sound peronei pull very forcibly, whilst the paralysed tibialis anticus is unable to fight against them; very well, we will take one of the peronei, the longus by preference, in order to transport and graft it on to the point of insertion of the tibialis anticus in a slight furrow hollowed out by a couple of cuts with

the chisel on the first cuneiform and in which we will lay the end of the peroneal tendon. We will fix it there by means of a small flat-headed nail or, still more simply, the peroneal tendon can be attached to the tendon of the tibialis a centimetre above its insertion and all round the insertion, to the periosteum, and to the ligaments which extend from the cuneiform to the first metatarsal bone. Care must be taken



Fig. 769.

to ensure that this graft on to the foot is maintained constantly in hyper-correction (therefore in varus) until the end of the operation, in order not to pull on the sutures, and afterwards we must again assure ourselves that the sutures are strong enough to preserve the hyper-correction.

We have already mentioned, in the general principles, that when it is a question of grafting one of the peronei, we prefer,

instead of making two very long incisions (extending from the middle of the external and anterior aspects of the leg to the middle of the external and internal borders of the foot opposite the attachments of the tibialis anticus and peroneus longus), to make three short incisions of about 4 centimetres in length, the first opposite the point where the peroneus longus passes round the cuboid, so that we may divide the tendon



Fig. 770.—Talipes calcaneus.



Fig. 771.—Club-foot, equino varus.

there ; the second at the lower third (junction of the lower and middle thirds) of the external surface of the leg, in order to expose the peronei, raising the tendon of the peroneus longus at this point and dividing, at the same time, the peroneus brevis, which is lengthened and slightly weakened by this division, and finally a third incision opposite the lower attachment of the tibialis anticus to the first cuneiform bone. It is easy to take account

of these different steps and to note how the central bit of the peroneus longus ascends to the upper incision, how it is then conducted through a subcutaneous tunnel from the upper to the inferior internal incision, that is to say, to the attachment of the tibialis anticus.



Fig. 772.—Talipes valgus.

As to the *peripheral* end of the peroneus longus, it is sutured to the peroneus brevis.

As we have already said, an Esmarch bandage is used during the operation.

A plaster apparatus is applied, with the foot in the position of accentuated varus.

Grafting the Tibialis Anticus to replace the Peronei

The operation is the same as the preceding, but in the reverse direction.

In the case of valgus, or of varus, as it nearly always exists with equinism, the tendo Achillis is also divided, or, better than that, lengthened.

Grafting the Peroneus Longus on to the Tibialis Posticus

The peroneus longus may also be transplanted on to the tibialis posticus, in which case it is better to make it pass not in front of the ankle-joint but behind it.

The Treatment of Talipes Calcaneus

Treatment of the bony malformations of the foot. Sometimes one should have recourse to osteotomies or to plastic resections; this is especially necessary in order to correct talipes calcaneus in a grave form. The milder forms of talipes without marked osseous malformation only require orthopædic redressment with shortening of the tendo Achillis. For refractory talipes, with pronounced bony deformity, talipes with hollow-foot, we proceed like our colleagues Withmann, of New York, and Jones, of Liverpool, either removing the astragalus or performing a double cuneiform resection.

Graftings and Transplantations about the Knee

In the case of paralysis of the Triceps, when the flexor muscles remaining intact have produced flexion of the knee-joint with grave functional troubles going so far sometimes as to make walking impossible, a large portion of the flexors are transplanted in front on to the insertions of the triceps or, rather, to the periosteum and the bony points in the neighbourhood of those insertions, and, better still, to the tibia around the attachments of the patellar ligament.

One takes for grafting the biceps on the outer side, the semitendinosus and semi-membranosus on the inner side. One may

also take the gracilis and the sartorius,¹ especially as the latter nearly always escapes paralysis, *vide* fig. 774.

Transplantations of the flexors generally give excellent results; not quite the *restitutio ad integrum*, but the patient

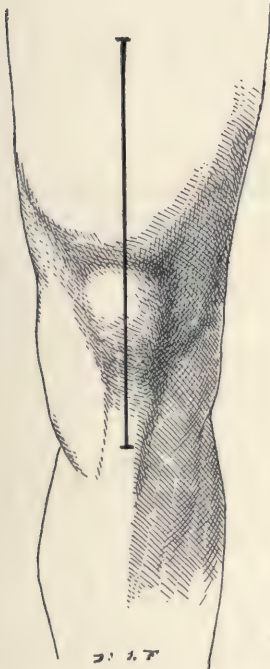


Fig. 773.



Fig. 774.

Transplantations of the Knee.

regains sufficient power to walk without an apparatus and to slightly flex his knee-joint at will, which is a great advantage.

At the Hip-joint.—Attempts at transplanting the gluteal

¹ The sartorius with the extensor proprius pollicis and the extensor fasciæ latæ is one of the muscles of the lower limb which most often remain intact. Unfortunately the sartorius, because of its muscular fibres extending very low down, is not an ideal muscle for a good graft.

muscles have not up to this time given results which compensate for the serious traumatism caused by such operations.

Transplantation in the Upper Limb

At the Shoulder.—The deltoid can be replaced by the pectoralis major or by the serratus magnus, or by the trapezius.

At the Elbow.—The biceps can be replaced with advantage by part of the triceps.

At the Wrist.—It is possible to replace an extensor of the fingers by one of the flexors.

Grafting of Nerves

Attempts have been made to substitute for transplantation of muscles the grafting of healthy nerves on to the nerves of paralysed muscles. The matter is still being studied, but the results are not so convincing as to warrant their record here. It may even be asked up to what point, at the present time, is it permissible to divide a sound nerve and attach it to an affected one, because there is very little opportunity of ascertaining whether the suture has been successful or otherwise, and if it should fail, the bad condition of affairs would be aggravated, since the muscles deprived of their nerves for transplantation would thus be sacrificed, either entirely, or at least partly.

The Value of Muscle Transplantation

Performed in selected cases,¹ it may not restore a limb to its normal condition, but a good equilibrium of the limb with some useful movements, may be obtained.

Treatment of Arrested Growth of Limbs attacked by Infantile Paralysis

They are treated at first by the same methods as for paralysis, although the arrest of growth may not always be

¹ Do not perform them before six years of age, and not less than two years after the appearance of the paralysis.

in direct proportion to the degree and the extent of the paralysis. Later, the wearing of high heels may be sufficient, so that one need not have recourse to the sanguinary operations of Vladimirow Mikulicz on the bones of the foot—operations which formerly we performed, but which we do not now, because one can obtain equally good results by purely orthopædic treatment.

On the other hand, the vitality of the articular cartilages may be stimulated by local counter-irritation, applications of tincture of iodine in garter fashion above and below the knee, electrification of the cartilages, and so on.

As to the parts played by surgical treatment and purely orthopædic treatment (correction and celluloid)?

And now, I must evolve from this rather long and dry exposition, which, however, was unavoidable, a rule for the guidance of practitioners.

Here is a patient brought to you with a paralytic club-foot which you had corrected with or without tenotomy, then put in a plaster casing; three months later, after removing the plaster and setting the foot at liberty, the correction is found not to have been preserved.

What are you going to do to remedy matters? Apply an orthopædic apparatus in celluloid or perform a surgical operation?

The Comparative Value of Operations and Apparatus.—There are two cases, according as the contemplated operation is a graft (the case of partial paralysis), or an arthrodesis or artificial ligaments (the case of complete paralysis).

1st. *Apparatus or Muscle Grafting?*—There is no doubt that grafting ought to be the better, especially in the case where the simple transplantation of a single muscle may save the patient from wearing an apparatus for the rest of his life. But will the parents consent to this? Without doubt, it is their affair; yours is to advise the operation and free your conscience; if they refuse, you have then only to construct an apparatus in celluloid.

2nd. *Apparatus or Arthrodesis?*—Here, on the contrary, the apparatus is preferable, in a number of cases, but that will depend much upon the affected joint, on the age of the patient, and his condition in life. But all surgeons do not agree as to the steps to be taken in identical cases. Thus one surgeon will



Fig. 775.—Infantile paralysis: There is complete paralysis of the right leg and the child is absolutely unable to walk. She is supported under the arms by her father. The knee is in an awkward position, and it is impossible for the sole of the limp foot to be placed on the ground.



Fig. 776.—The same child after our treatment. She places her foot on the ground normally, and she is now able to walk.

perform arthrodesis in nearly every case of a deformed limb or joint; another surgeon of equal prestige will never, or scarcely ever, do this, while still another, which is very significant, after performing many such operations, will do no more of them. The first will say: What an advantage it would be to avoid

having patients wearing apparatus all their lives, especially poor patients !

The others would reply : That may be, for poor persons who are unable to pay for an apparatus or for its renewal when necessary, but how many of those same poor persons might take advantage of an Institution to supply them ?

In any case, where the patient is in easy circumstances the apparatus is generally better for him than arthrodesis. *In the foot*, for example, with a jointed apparatus allowing of limited



Fig. 777.—Infantile paralysis : The patient moves on all-fours. (See the same patient in the following figure.)

play, walking would be more free and easy than with an arthrodesis successfully performed ; the proof of this lies in the fact that in a great number of cases operated upon the patients return to entreat the surgeon to undo the ankylosis.¹

As to the knee, a patient with ankylosis following arthrodesis finds himself very much hampered in a room, a carriage, or an omnibus by his long rigid limb, while with an apparatus furnished with a movable screw adjusted by hand through an opening in

¹ Which is impossible, especially when several joints in the foot are ankylosed.

the clothing, the apparatus allows the patient to bend the limb when he sits down.

In the case of this articulation also, patients have returned later on to request the surgeon to try to undo the ankylosis. I might cite the case of such a patient who, when operated upon,



Fig. 778.—The same patient, after our treatment; she is able to walk.

was in poor circumstances, and being now able to afford a jointed apparatus is very anxious to recover his lost mobility. It is proper to add, on the other hand, that many of those operated upon are very satisfied with the operation which has given them a firm knee-joint; they are generally labourers accustomed to hard work.

For *the hip*, still more than for the knee and the foot, an apparatus is preferable to arthrodesis—without even mentioning those patients following an occupation which arthrodesis would render practically impossible, or at least very painful, for example, shoemakers or tailors.

As to the **upper limb**, one could, even in *the shoulder*, replace arthrodesis

by an apparatus, keeping the joint rigid in a good position. At the *elbow*, excision of a strip of skin would fix the forearm at an acute angle. One could in the same way fix the *wrist* in extension.

The eclectics recommend arthrodesis for the shoulder, the knee,

and the foot, but do not advise it for the hip, the elbow, and the wrist.

3rd. *Artificial Ligaments*.—These save the patient from an apparatus without having the inconveniences of arthrodesis, which seals his future beyond redemption.

Unfortunately artificial ligaments have deceived many specialists; I know some who, having formed artificial ligaments, have not wished to hear any more about them, they having always, or nearly always, given way, without counting the cases where the silk threads have been eliminated through infection or owing to their intolerance by the tissues.

Personally, I owe them as many successes as failures.

I believe that when the technique has been perfected, and particularly when the number of threads has been increased, the employment of the ligaments will be much extended, and that whilst arthrodesis will remain the treatment for the poorer classes, artificial ligaments¹ will become the treatment for the rich, excepting always the case of the knee and the hip, where a jointed apparatus with a rack arrangement movable at will would be preferable. Such is the summary of our means of treatment in Infantile Paralysis—means which it is often necessary to combine (grafting, arthrodesis, artificial ligaments) in patients presenting multiple lesions and varieties of mischief.

¹ They may be had recourse to under ten years of age, unless arthrodesis is to be done later, if it should become necessary.

THIRD PART

CONGENITAL ORTHOPÆDIC AFFECTIONS

CHAPTER XIV

CONGENITAL LUXATION OF THE HIP-JOINT

A.—Diagnosis

FIRST of all, a word on diagnosis and prognosis.

1st. PRESUMPTIVE SIGNS.—They bring to you a child—generally a little girl—who is lame on one or both sides, **waddling** and **balancing** herself on her hips, **like a duck**.

She walks easily enough, like a child who is **in no pain**. Here already are two signs : the characteristic gait and the absence of pain, which ought to make you think of a congenital luxation of the hip, even before the parents have said anything about her.

If the swinging, if the rolling movement exists on both sides, the thing is almost certain. If the swinging is on one side only, it is **merely a presumption**.

2nd. SIGNS INDICATING PROBABILITY.—But the parents say to you : Our child **has always walked in this way**, from her very **first attempts**, which, however, were **late**, for she did not commence to walk until sixteen, eighteen, or twenty months. She has never suffered pain. The **waddling** attracted no attention, but it now seems that it is becoming exaggerated, and that one **leg** is becoming **shorter** than the other.

With this history, the existence of a congenital luxation of the hip becomes **probable**, even more than probable. However, you

will not be able to affirm that it is so until after having examined the child *completely naked*, first in the upright position and whilst walking, then laid on a table or on the floor.

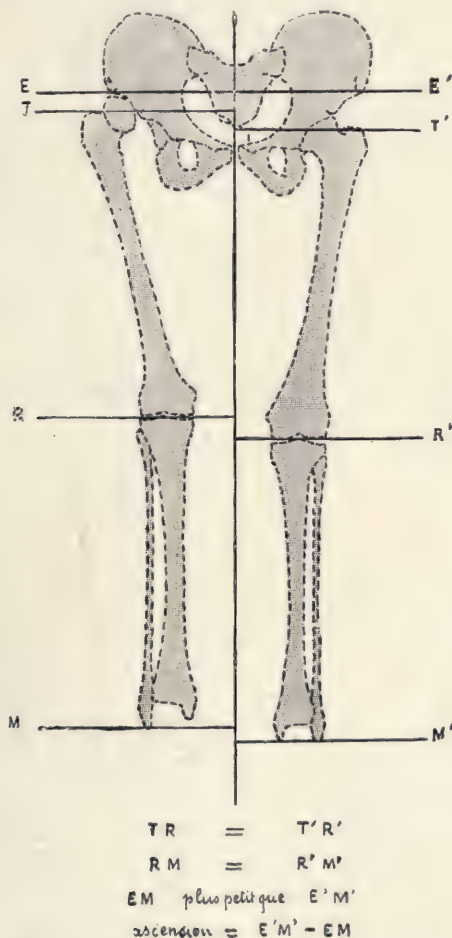


Fig. 779.—Congenital luxation of the right hip.

Character of the Gait.—When the child walks, you will see that the **great trochanter is more prominent** on the lame side (see fig. 779 to 784), **rising** into the buttock and **descending** with

each step. It rises with each tread, as if the sole of the foot had been placed on a spring.



Fig. 780.—Right congenital luxation of ten years' standing. One sees the wasting of the luxated limb. The shortening is enormous. The sound leg is obliged to bend on itself at the knee when both the heels are on the ground.

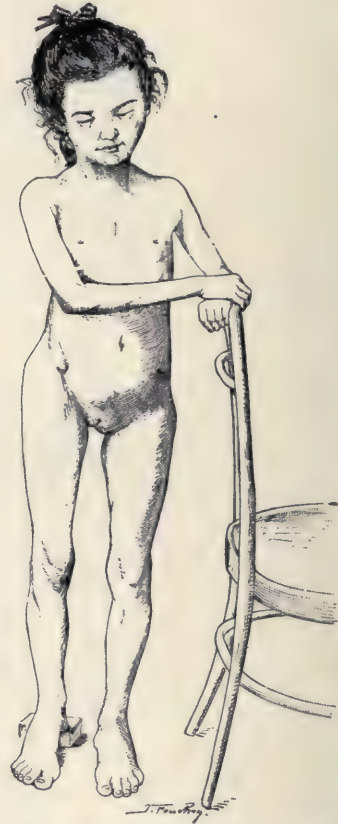


Fig. 781.—The same. The sound limb is no longer bent at the knee, the heel of the luxated side no longer touches the ground (the iliac spines remaining at the same level). The trochanter, more prominent and more raised on the side of the luxation. The labium majorum is also drawn up on this side.

Examination in the Recumbent Position.—On placing the two iliac spines at the same level, and then bringing together the two

feet, you see that one limb is shorter than the other, if the child is lame on only one side. The great trochanter is prominent on this side; it is **raised** above **Nelaton's line** (fig. 782), which you determine by carrying a tape from the iliac spine to the ischium,¹ whilst the thigh is flexed at an angle of 45° ; more than that, the trochanter is



Fig. 782.—The same, seen from the side. Lumbar hollowing. One sees how the great trochanter is raised above Nelaton's line. If there were no luxation, the trochanter would be level with Nelaton's line. Shortening of the limb (heel off the ground, the two iliac spines being at the same level.



Fig. 783.—The same, seen from behind. Lateral deviation of the back with convexity on the sound side. It is so in most of the cases (but not always).

moved away from the median line; the labium majorum is drawn upwards.

On looking at the profile, you will see a lumbar concavity. But that does not give you the *certain sign*.

3rd. **THE CERTAIN SIGN.**—You will obtain this by palpation of the hip made when the child is lying down, the thighs well extended.

¹ For Nelaton's line see fig. 392 and 785.

Palpation of the Hip (fig. 786 to 791).—This will give you two indications which, taken together, are pathognomonic.



Fig. 784.—Examination of the child in the recumbent position. Very distinct shortening of the limb. The trochanter is raised above Nelaton's line (to an extent practically equal to the shortening).

1st. If, clasping the upper part of the thigh with the hand half

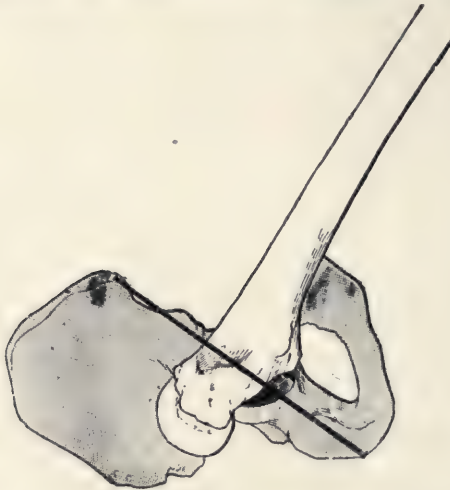


Fig. 785.—Luxated hip. Relations of Nelaton's line and of the trochanter in the skeleton (the thigh flexed at an angle of 45 degrees).

opened, the four last fingers behind the trochanter, the thumb in front, you endeavour to palpate **the head of the femur** in its

normal situation, that is, in the fold of the groin, beneath the femoral **artery**, which **crosses** the **head** at the junction of the inner third and external two-thirds—you will feel **no osseous resistance**; you will find an **empty space** below the anterior border of the iliac bone.

To render this impression more striking, compare it with the other,

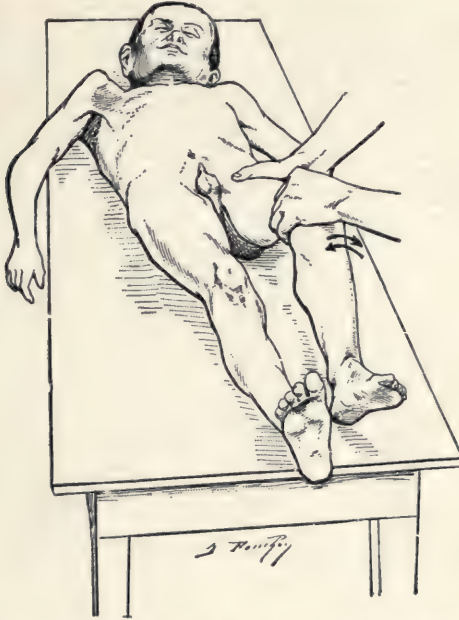


Fig. 786.—Diagnosis. Method of palpating the head of the left femur. The position of the right hand; the four fingers behind; the right thumb in front in touch with the artery. The left hand grasps the limb at the knee, imparting to it the different movements of internal and external rotation, flexion and hyper-extension, abduction and adduction. The right thumb is against the outer side of the femoral artery which is felt with its tip.

normal, hip. You will perceive there, on the contrary, very distinctly, the bony resistance of the head (which is out of the acetabulum for a centimetre or a centimetre and a half) and even of the anterior surface of the neck (see fig. 332 and 333, p. 349-350).

2nd. If you grasp the knee of the suspected side and impart to it extensive movements in all directions, you generally observe, and you always **feel, above and inside of the empty space** mentioned

above, a **rounded, mobile body**, very imobile, raising the skin in front (fig. 790) during the movements of **hyper-extension**, of **external rotation** and of **abduction** of the knee, raising it, on the contrary, behind (fig. 791), towards the buttock, in the opposite movements of flexion of internal rotation and adduction; palpate this hard, rounded body—it can only be the head of the femur.

Here is the certain sign of luxation. Moreover, the **history** enables you to say that it is congenital.



Fig. 787.—Method of palpating a normal hip-joint. Exploration of the head. The trochanter is embraced by the first interdigital space, the thumb in front; the other fingers behind are able to feel only very feebly the movements imparted to the head.

Diagnosis of Double Luxation (fig. 792).—Double luxation is recognised by the waddling gait existing on both sides, by the projection of both trochanters and their position above Nelaton's line, by the shortness of the two thighs in comparison with the length of the legs, and, finally, by the perception on both sides of a vacant space, where the head of the femur ought to be found, and the recognition of the head above and outside its normal situation.

B.—Prognosis

The lameness from birth which, hardly twelve years ago, was considered to be incurable, **can generally be cured** to-day ; it is no longer possible to doubt it (without the exhibition of inexcusable ignorance), after the number of proofs clinical, radiographic and

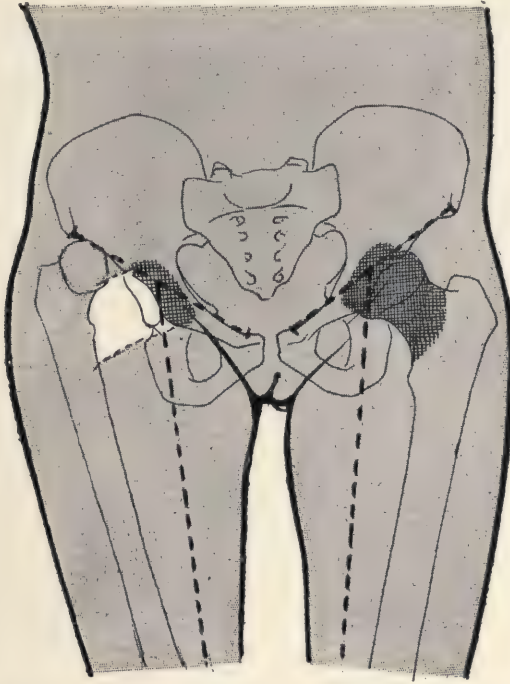


Fig. 788.—Normal hip on the left, luxated hip on the right. On the left, one finds a bony resistance very high up. On the right, a sensation of an empty space : below the pelvic margin and on the anterior wall of the acetabulum, represented by hatching, one sees the empty space represented in white, where the head and neck of the femur ought to be.

anatomical, which we possess. Some hundreds of children have already been cured, that is, they are no longer lame at all, and several autopsies of children treated, dying of intercurrent diseases, have shown that the head of the femur had been replaced in the normal position and kept there.

This "preliminary question" of the **curability** of congenital luxation is, then, no longer disputable.

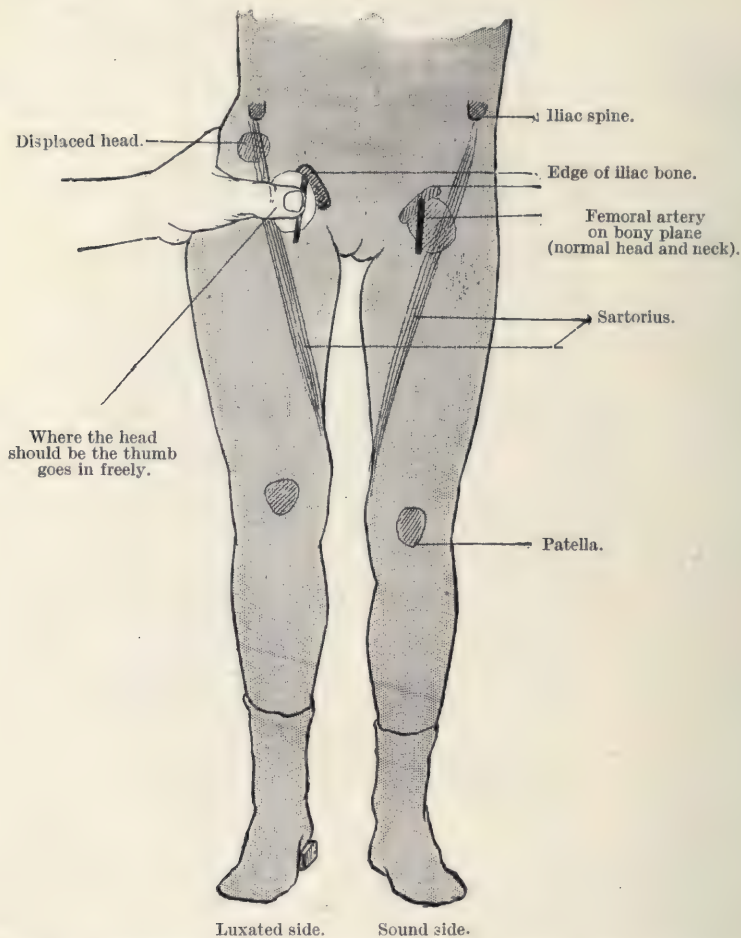


Fig. 789.—Congenital dislocation of the right hip. Diagnosis.—One sees : 1st, the shortening of the leg on this side, raising up of the heel, the knee and the labium majorum ; 2nd, the great trochanter (partly hidden by the hand) is more prominent on this side ; 3rd, the certain sign obtained by palpation : whereas, on the left (normal) side, one feels the bony resistance of the head of the femur under the artery below the margin of the pelvis, on the right (luxated) side, the finger penetrates freely under the artery, the head being no longer in its place ; 4th, one finds the head above and behind its normal position, near the anterior spine, underneath the sartorius. One sees that the luxated head is rather smaller than the other.

More than that, one cures by a treatment which, far from being complex and uncertain—which it lately was—has become, during the last few years, so simple, so harmless, so well understood, that it



Fig. 790.—Exploration of the head. To make the head project forwards, one places the limb in hyper-extension and external rotation.

may be performed henceforth, by all practitioners of ordinary intelligence, with the proviso, always, that one deals with children in their earliest years, from two to five.



Fig. 791.—Exploration of the head. By the opposite movement of the limb (flexion, internal rotation and adduction) one carries the head backwards into the buttock.

I agree that, after that age, the treatment is, for practitioners who are not specialists, too arduous and too uncertain, and I hardly advise them to interfere in cases above 6 or 8 years of age: but, at 2, 3 and 4 years, all practitioners, I repeat it, will succeed, by following

the indications given in this chapter, in reducing, and keeping in position, a congenital luxation.

Remember that, in practice, it is to them, it is to the family doctor, that these children are shown in their first attempts at walking, or, at least, within 2, 3 or 4 years.

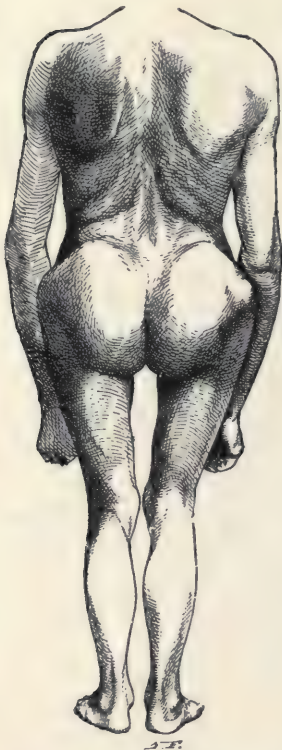


Fig. 792.—Double luxation seen from behind. One can remark the enormous projection of the trochanters, the apparent shortness of the thighs, and their broadening at the upper part, as soon as the knees are in contact.

Your diagnosis established, the parents ask you what is to be done; you will reply that it is necessary to reduce the dislocation as if one were dealing with a traumatic luxation of the shoulder; that you arrive in this way at complete cures and, one may say, permanent cures; but that, as in traumatic luxation, it is necessary to lose no time, because if **reduction** is possible and even **easy at the beginning**, that is, at 2, 3 or 4 years, it becomes very difficult in later years, and even impossible to undertake at, say, from 12 to 15 years.

More than that, at 2 years of age there exist little or no secondary lesions of the skeleton, and for that reason the cure that one can obtain in very young children is more perfect and more permanent.

On the contrary, *left to itself*, the luxation is aggravated year by year up to the prohibitive age—always or nearly always. The lameness will become more and more unsightly and the attempts at walking more and more feeble. It is not uncommon to observe, at a certain period, painful crises, and even an almost complete inability to walk.

Therefore, **delay in treatment** on the part of the practitioner when he recognises the condition, is no longer excusable.

The Best Age for Commencing Treatment

What we have said shows that it is of supreme **importance** to reduce congenital dislocations at the age of a year and a half, or, **at least**, at **two** or **three years** (see p. 816, *The Limits of Reducibility*).

TREATMENT¹

The treatment consists, as a routine, in replacing the head of the femur in the uninhabited acetabulum, the reduction being easy here, in children of 2, 3 or 4 years—and in keeping it there by a plaster for 5 or 6 months. This period suffices for the acetabulum to be hollowed, for the joint capsule to contract, that is to say, for the head to make in its normal position a stable and definite domicile.

After these 5 or 6 months, one sets the limb at liberty. The reduction will henceforth maintain itself, and walking will become, a few months after removal of the plaster, that of a normal child.

I.—THE TREATMENT IN EASY CASES

that is, in children of two or three years of age.

A.—UNILATERAL LUXATION

It is necessary for us to study the method of reducing the displacement and the method of maintaining the reduction.

1st. The Reduction

At two or three years of age, you can proceed **immediately** to the reduction, that is, from the very day the child is brought to you, or on the next day.

You will be able to reduce without anæsthesia, if the parents absolutely object to it. But, in all cases where you have entire

¹ Pravaz, Paci, Lorenz, are three names one must always quote when speaking of this treatment.

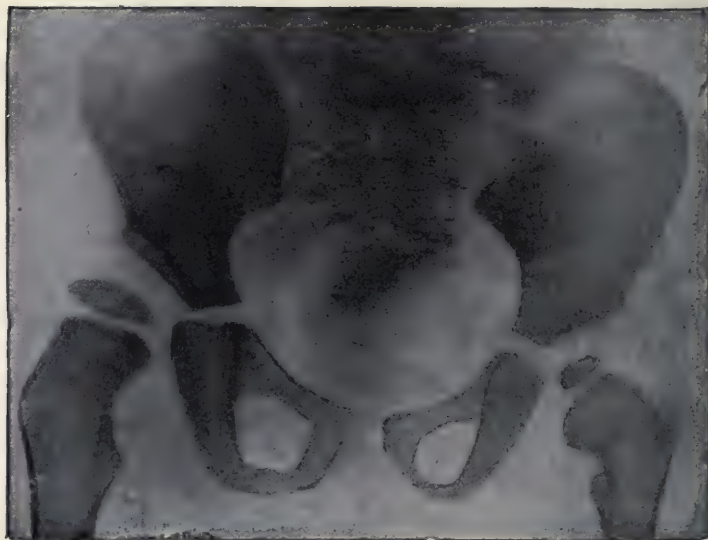


Fig. 793-794.—The case of a child, 3 years of age, perfectly cured because there had been as yet no osseous deformities.

liberty of action, you will anæsthetise the child, which will save



Fig. 795-796.—Case aged 11 years : a less perfect result here, because the osseous deformities persist, in particular a coxa vara, very marked on the left side.

it from all pain and will very much facilitate your proceedings.

Manœuvres Preparatory to Reduction

The child being anæsthetised, **before attempting to reduce**, it is necessary to perform brassage, kneading and stretching the adductors and to make wide movements of circumduction of the thigh, in such a way as to render supple

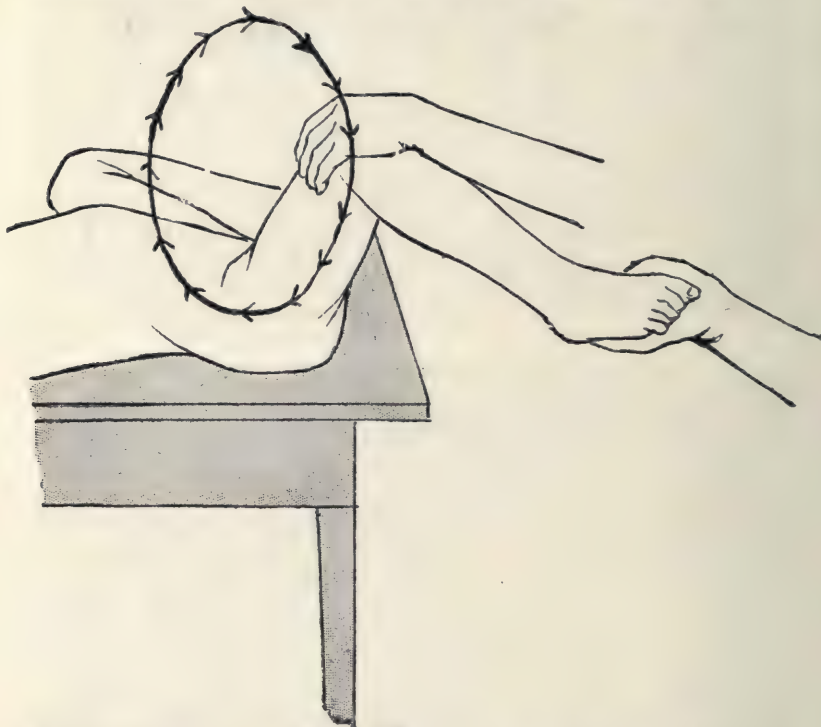


Fig. 797.—*Manœuvres preparatory to reduction* (1st step). Movements of circumduction to stretch the contracted peri-articular tissues.

and stretch the soft tissues, articular and peri-articular, which have become contracted (see fig. 797).

I have no need to describe at length these movements of circumduction, which will be made in all directions (for a few seconds), but I ought to explain the method of performing kneading of the adductors.

Kneading the Adductors.—The pelvis being immobilised on the table by an assistant, who takes the sound limb in his hands and holds it firmly flexed on the abdomen or on its outer side (fig. 798 and 799), you request a second assistant to make firm traction upon the affected **thigh extended** and carry it more and more **into abduction** (fig. 798), or to **flex the thigh at an angle of 90°** , and carry it afterwards in



Fig. 798.—Kneading and stretching the adductors **in extension** of the thigh. The pelvis firmly fixed and supported by an assistant pressing the flexed, sound limb upon the abdomen; a second assistant pulls upon the affected limb and carries it into abduction. The surgeon exercises, with his clenched fist, some frictional movements along and upon the stretched cord, at the upper insertion of the adductors.

abduction (fig. 799) as far as possible, proceeding slowly and methodically; but the assistant is very soon stopped, evidently by the resistance of the adductors, which are there, visibly stretched.

Place your two thumbs or your bare fist over the pubic attachments of the muscles, *over the prominent cord*, and press upon it more and more firmly, whilst the assistant carries the

thigh still outwards. After one or two minutes of kneading, of

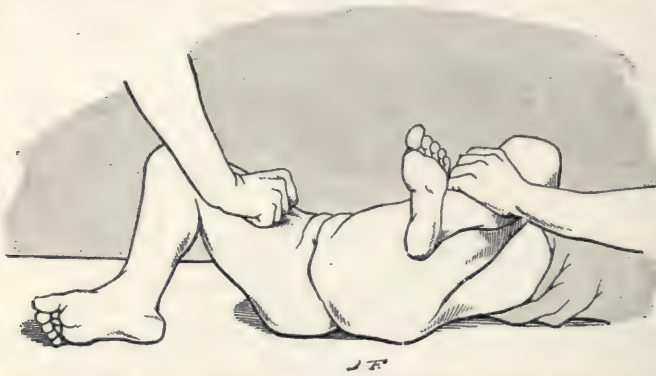


Fig. 799.—Kneading of the adductors (on the right side), the affected thigh being **in flexion** and no longer in extension. The thigh is carried into abduction after having previously been placed in flexion at an angle of 90 degrees; the surgeon acts upon the adductors in the same fashion as in the preceding figure.



Fig. 800.—Reduction: *1st manœuvre*. Pelvis firmly fixed by an assistant. One grasps the knee, one carries the thigh into flexion at an angle of 90 degrees and makes traction very firmly upwards. With the left hand, one furthers reduction by pressing on the head of the femur.

pressure, and straining, you see and you feel that the muscles are giving way and permit of a much greater abduction of the

thigh. Push this up to **abduction at a right angle**, that is, up to the point where the knee touches the table. You will be able to reach this point without rupturing the muscles, by simply stretching them.

At the beginning of the operation, you will confine yourself to this simple kneading; you will not decide upon the rupture until later in the case, when it is quite evident in the course of the operation that you are not able to effect reduction without complete rupture; but this will never, or very rarely, happen in the small children



Fig. 801.—Route followed by the head round the acetabulum in the different positions of the thigh; (a) position at the beginning.



Fig. 802.—(b) In flexion of the thigh of more than 90 degrees.

of whom we are speaking, those of 2, 3, 4 years of age.

You can then obtain the rupture by pressing more and more firmly, being helped, if need be, by two thumbs placed over your own.

After the kneading and stretching of the adductors, the reduction will have become easy. The adductor muscles are so

really the direct obstacles to reduction that I have several times seen children of 8, 10 and 12 years, in whom lengthening only



Fig. 803.—(c) In flexion at 90 degrees.

of the adductors in the position of **flexion and abduction** at an angle of 90° (fig. 806) has brought about the reduction,



Fig. 804.—(d) In making traction in flexion at 90 degrees and adding to it a marked abduction and very slight external rotation, one makes the head **re-enter** the acetabulum.

that it to say, that reduction effected **itself** whilst one was carrying out the manœuvre of stretching the adductors.

This ought to make us remember that abduction of the thigh is of great assistance in reduction.

Manœuvres of Reduction

To reduce the congenital displacement, you will employ, in a general way, the **manœuvres which you would instinctively carry out**, in order to reduce a **traumatic luxation of the hip** in the same child.



Fig. 805.—*1st manœuvre* (see fig. 800) made by two persons: one assistant pulls on the affected thigh, grasping it with his two hands a little above the knee. The surgeon applies his two thumbs directly over the head of the femur in order to push it into the acetabulum.

1st Manœuvre.—**Flexion** of the knee at an angle of 90° and **direct traction** on the flexed knee (**without abduction, adduction** or rotation).

(a) One makes traction with one hand; with the other, one presses upon the head outwards and inwards to assist reduction (fig. 800).

(b) The manœuvre is made by two persons; one pulling on the knee, the other pressing directly upon the head of the femur (fig. 805). Persist for 1, 2, 3 minutes, until, under your fingers,

you feel the head disappear all at once into the parts beneath with a more or less distinct snap ; it is reduced.

The first manœuvre nearly always succeeds in quite small children. If not (after 3 or 4 minutes of fruitless efforts), one passes on to the following manœuvre :—

2nd Manœuvre.—Reduction in abduction of the thigh at an angle of 90 (without rotation or with only slight rotation). One commences by flexing the thigh to an angle of 90° ; then



Fig. 806.—2nd manœuvre. The thigh is flexed to an angle of 90 degrees, and then carried into forced abduction. In this movement, the femur see-saws under the thumbs of the surgeon, who presses the head from below upwards (reduction is effected in a variable degree of abduction, according to the case).

one carries it into abduction with one hand, whilst the other hand presses from below upwards upon the head. One increases the abduction more and more up to a right angle, or, rather, until the reduction is effected.

One can perform this manœuvre alone, though better with an assistant, one effecting the abduction of the knee, the other making direct pressure upon the head of the femur from below upward (fig. 806).

If this manœuvre, repeated five or six times during three, four, or five minutes, does not succeed, carry out the following, with which you will always succeed.

3rd Manœuvre.—Reduction with the thigh in adduction and internal rotation of 90° . This manœuvre is almost the reverse of the preceding one (fig. 807 to 813).

The child being laid on the sound side, and the pelvis supported in this position by two firm hands, one assistant takes



Fig. 807.—3rd manœuvre, characterised by abduction and internal rotation added to flexion. The child laid on its sound side, the assistant grasps the thigh at its lower third, carries it in flexion to 90 degrees, then in forced adduction and internal rotation of 90 degrees. The surgeon presses with his thumbs upon the head of the femur, which has become much more accessible in this position of forced adduction. Four persons may be necessary to perform this manœuvre, two for pushing the head of the femur and two for traction at the knee.

the affected thigh, flexes it at a right angle, then carries it, not as before, outwards, but inwards, in forced adduction, adding to it an internal rotation of 90° (note carefully that I say **internal** rotation), and pulls on the knee as much as he is able. Then you yourself, placing your two thumbs on the head of the femur, easily perceptible above (see fig. 807), push it with all your strength towards the acetabulum.

It will make its way there, generally* without any snap, with this manœuvre. When you have felt it sink under your

thumbs and disappear into the deeper parts, you request your assistant, who is holding the thigh in adduction, to bring it (fig. 808) into abduction little by little, pulling it always towards him, until it has reached an abduction of 90° (fig. 809), that is, in a word, to the position indicated in the second manœuvre (fig. 806).



Fig. 808.—3rd manœuvre (*continued*). The assistant at the knee, making continuous and strong traction towards him, raises himself gradually in order to reach the position of abduction. The surgeon continues to press upon the head of the femur. The second assistant shown here immobilises the pelvis.

This changing from inwards to outwards, made whilst you keep the head closely applied against the acetabulum with your thumbs, achieves and completes the reduction.

SIGNS THAT REDUCTION HAS BEEN OBTAINED (fig. 814 and 815)

The reduction **is felt, is seen, is heard**, just as it is when you reduce a traumatic luxation of the shoulder.



Fig. 809.—3rd manœuvre (concluded). The thigh cap is brought gradually to an abduction of 90 degrees.



Fig. 810.—Explanation of the 3rd manœuvre.

You feel the head disappear deeply, and the assistant also

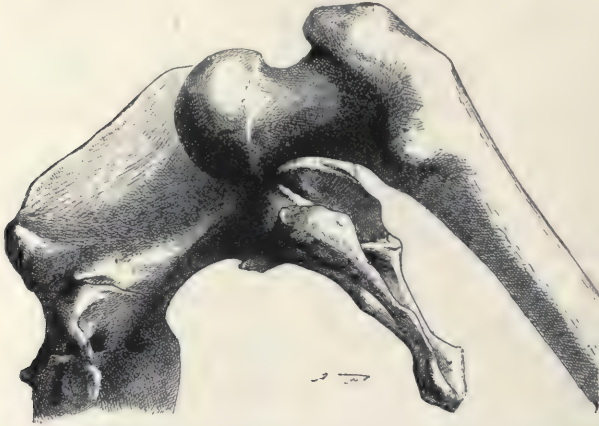


Fig. 811.—Explanation of the 3rd manœuvre (*continued*). The head strikes against the posterior border of the acetabulum.

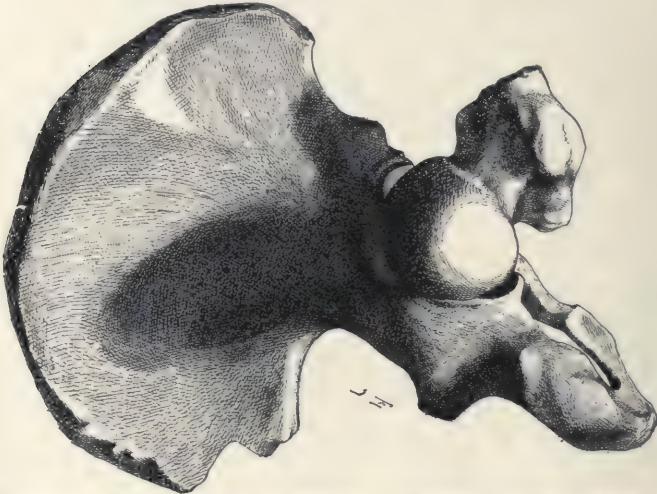


Fig. 812.—Explanation of the 3rd manœuvre (*continued*). Position in fig. 811, posterior view.

feels a jerk ; the assistants themselves see the head start and hear the snap.

One cannot be deceived as to this.

Should you wish, however, to render the reduction still more certain, *undo it*.

To do so, replace the knee inwards by pushing upon it ; the reduction is **undone** with a snap and a jerk, sometimes very violent but always very distinct.

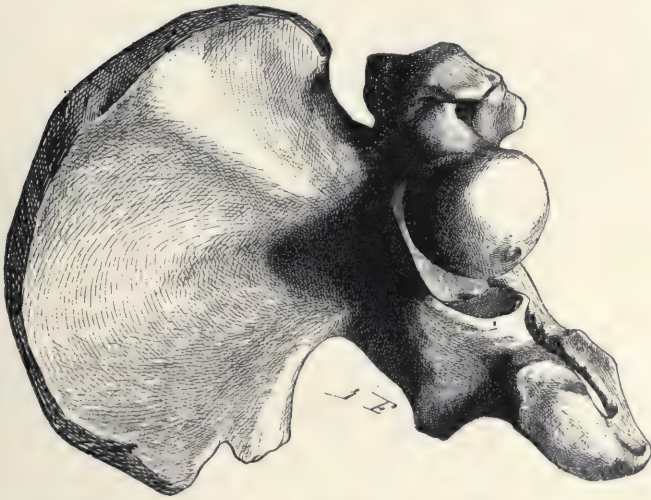


Fig. 813.—Explanation of the 3rd manœuvre (*continued*). It is necessary, in order that the head may re-enter the acetabulum, to put the femur in very marked internal rotation.

You repeat the reduction as on the first occasion, but it will be obtained more easily ; you repeat this three or four times, which has the advantage of perfecting the reduction (see also fig. 818).

After which you will occupy yourself in giving to the thigh the position desired for its fixation in the plaster apparatus.



Fig. 814.—Diagnosis of reduction. The manœuvres of reduction terminated, the surgeon brings back slowly the thigh inwards, at the same time he presses firmly on the knee. In a moment the head of the femur leaves the cavity abruptly, producing a more or less loud clicking sound. And one feels it again making a prominence behind the acetabulum, as before the reduction.



Fig. 815.—Diagnosis of reduction by palpation. The left thumb is over the artery. It ought to feel the head of the femur rolling under it when the right hand imparts movements of internal rotation to the thigh.



Fig. 816.—Right congenital luxation: a girl of 10 years.



Fig. 817.—Radiogram taken immediately after reduction (see fig. 839).

2ND. Maintaining of the Reduction—Position to give the Limb

The reduction, thus repeated several times, preserves itself for a moment, but it will not continue so indefinitely, and one is obliged to fix it with an apparatus (reaching from the waist to the toes) for a period of several months, from five to six. This fixation will be effected with two apparatus, two and a

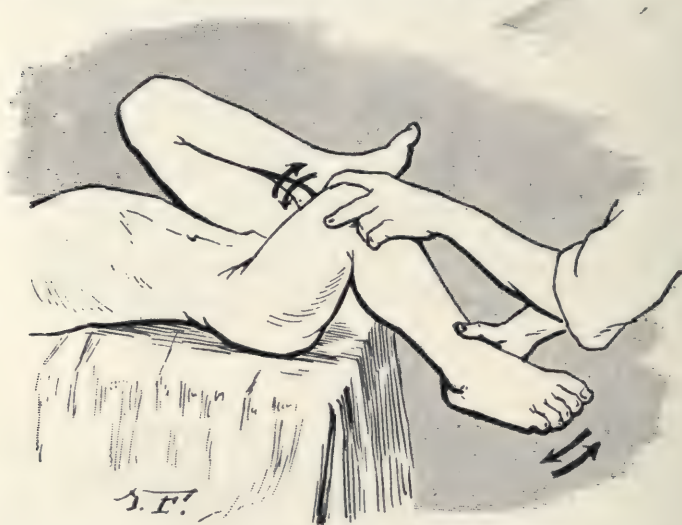


Fig. 818.—By some movements of rotation outwards and inwards one enlarges the osteo-fibrous lodging-place of the head, one perfects the reduction. This is helped also by making some movements of forced extension of the leg upon the thigh, which elongates the muscles inserted in the popliteal space.

half months for each, applied in two different positions of the leg.

First Position, First Plaster

One does not always maintain the head in the position to which one has reduced it; the position after reduction may vary according to the case, whilst the position of maintenance remains always the same (see fig. 818 to 823).

Here is the position which you will give to the thigh in the first plaster, immediately after the reduction. I formulate it



Fig. 819. — Position to be given in the plaster.—On the right of the figure, bad position ; on the left, good position. This figure shows that the position chosen by us, 70, 70, and 0 degrees, is the most favourable for excavating the acetabulum. On the right, the femur is placed in an abduction of 90 degrees or more, that is, its axis is parallel to the plane of the table. The pole of the head strikes against the anterior part of the capsule, which it raises (bad position). On the left, the femur is in the chosen position ; the centre of the head obviously corresponds with the centre of the cavity, or, rather, a little in front of that point (good position).

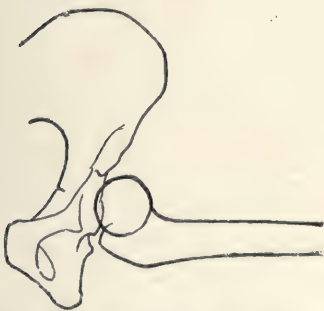


Fig. 820.—From radiograms. Bad position. Abduction of 90 degrees or "hyper-extension," which gives at once, the same day, a tendency to anterior relaxation.



Fig. 821.—Good position. An abduction of from 70 to 80 degrees gives a very good reduction.

thus : 70, 70 and 0 ; which means : 70° of flexion, 70° of abduction, and 0° of rotation ; it is the position at which one arrives in

placing the thigh, first in a **flexion** of about 70° (70° to 80° ; fig. 824), then in carrying it, from that degree of flexion, directly

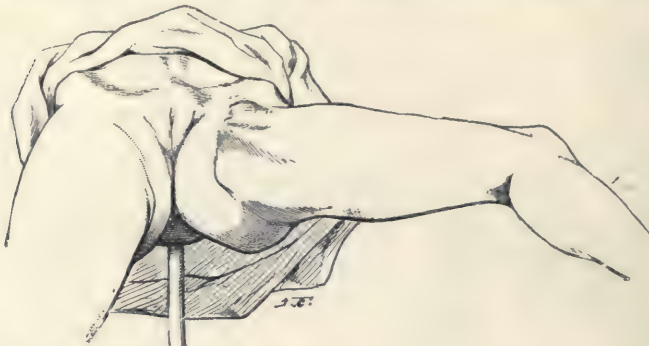


Fig. 822.—Bad position, or, at least, mediocre, of abduction at 90 degrees, or of hyper-extension.

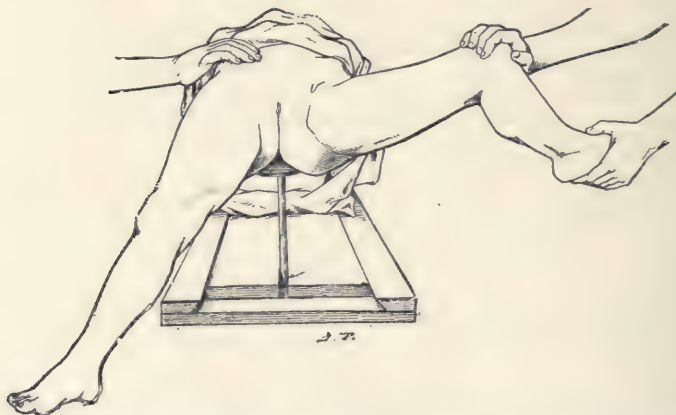


Fig. 823.—Chosen position. Flexion 70 degrees; abduction 70 degrees; rotation 0 degree.

outwards up to about 70° of **abduction** (70° to 80°), **without** imparting any **rotation** to it whatever¹ (fig. 825).

¹ The thigh appears then to be in external rotation, but it is only so in appearance. Try on yourself to flex the thigh to 90° and from that point to carry it directly to 90° of abduction. Your thigh will appear to be in external rotation, nevertheless you have not made rotation at all: the thigh is stopped in "indifferent" rotation, at 0° .

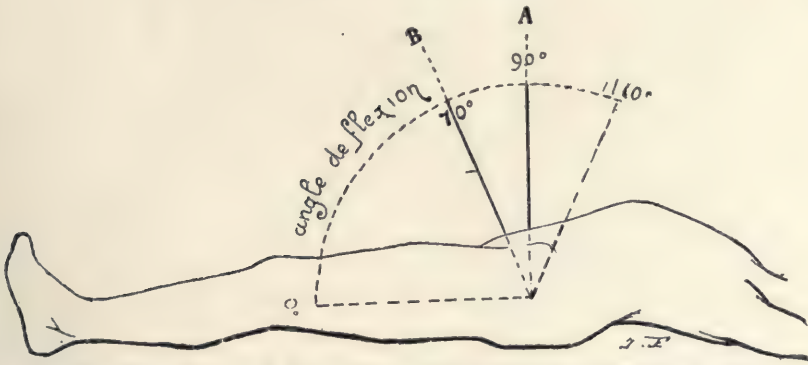


Fig. 824.—Plane of pure or direct flexion. Vertical plane parallel to the vertical plane dividing the body into two halves, right and left. When the knee exceeds 90 degrees, in approximating to the abdomen, it is placed in "forced flexion" of 90 degrees + n degrees.

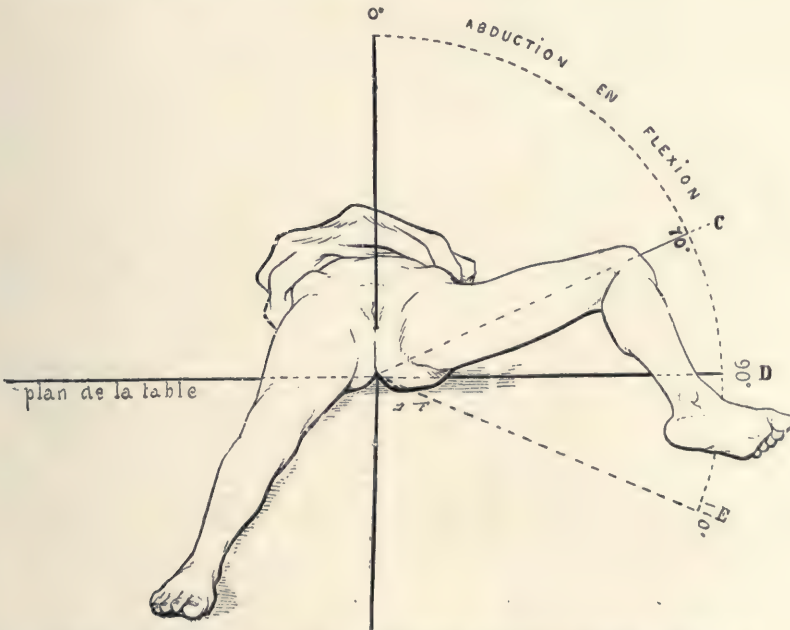


Fig. 825.—Abduction in flexion in the vertical transverse bicotyloid plane, or in a plane parallel to it (the subject recumbent). It seems that the left knee, arrived thus in D, is in external rotation of 90 degrees, because the patella looks towards the child's head. In reality, the femur is at 0 degree of rotation for this position of the thigh (flexion of 90 degrees, followed by an adduction of 90 degrees).

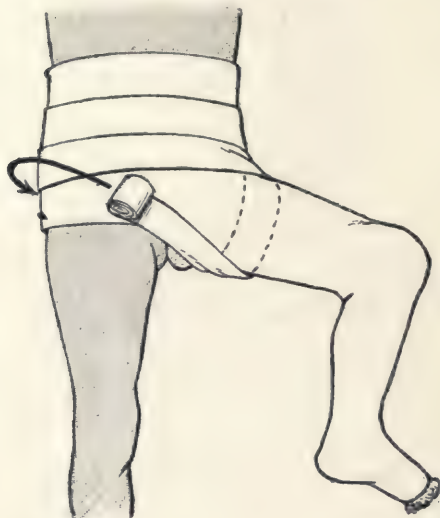


Fig. 826.—How one applies the bandages at the root of the thigh.

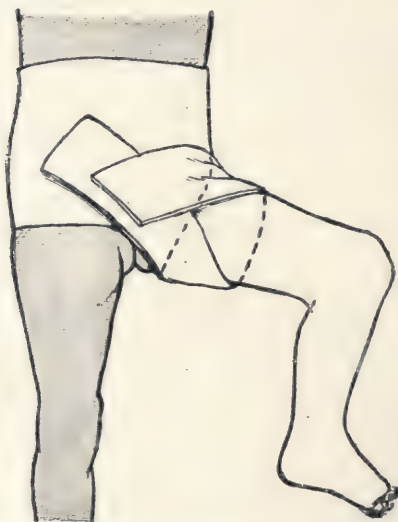


Fig. 827.—How one strengthens the plaster round the hip with a plastered strip 80 cm. in length, 20 cm. wide, and three or four thicknesses of muslin.

70°, 70° and 0°, that is the **position by choice** of the thigh, the best position for the excavation of the acetabulum. As to the leg itself, it is flexed at an angle of 90° to 100° on the thigh, and, consequently, the foot is found drawn inwards, its internal border upwards.

The *plaster* is constructed in the way you already know (see the



Fig. 828.—Strengthening the waist and the front of the thigh by two other supporting pieces.

construction of the apparatus in coxitis, Chap. VI.), over a jersey, with bandages and strengthening pieces (see fig. 826 to 830).

Two or three bandages, 5 metres in length and 10 cm. wide, are necessary for a child of from two to four years. One uses three plastered strips for strengthening the apparatus.

The last bandage applied, one encircles with the hands the reduced hip, pressing especially upon its posterior part, so as to model the plaster over the trochanter ; it is here a supplementary

precaution. But do not be concerned: with the large plaster and the position we have mentioned, the reduction will be maintained very well, and the precaution of making a furrow in the plaster opposite the trochanter is almost superfluous.

Half an hour after the plaster has set, one trims it (see p. 33).

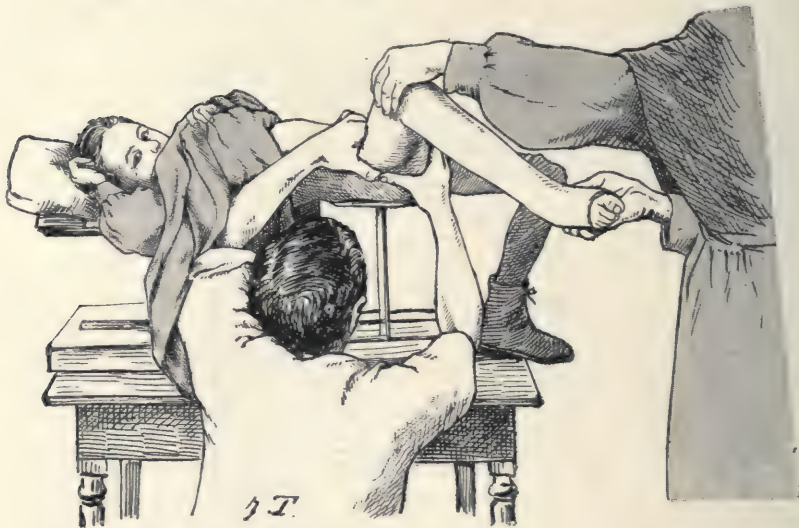


Fig. 829.—Modelling of the plaster apparatus. When the apparatus is finished, the limb is placed in the corrected position, and kept there by an assistant. The thumbs of the surgeon, which have not left their place during the application of the plaster, fashion a gutter behind the neck whilst the plaster is drying.

3RD. Post-operative Treatment

The post-operative treatment is very simple.¹ For several days, however, and especially several nights, children are a little irritable and nervous. Give a soothing draught.

¹ (a) A subcutaneous hæmatoma is produced sometimes, where the superior attachment of the adductor has been bruised or ruptured. Leave it alone; it will be re-absorbed spontaneously. Simply hollow out the plaster at this level; apply cotton-wool dressing.

(b) It is necessary to inspect the toes for the first few days, with regard to circulation and sensibility (see pp. 34 and 35 as to precautions). During cold weather, the free extremities of the toes should be enveloped in cotton wool.

(c) Sores; the means of avoiding them (p. 65). The way to recognise and cure them (see p. 66).

Then, those few days passed, the child may be allowed to go home. Recommend the parents : 1st, to avoid constipation ; and 2nd, to prevent soiling of the plaster with urine. For this, one places impermeable canvas or non-absorbent wool over the apparatus ; attentive mothers will manage very well to keep the plaster in good condition. Nothing else is to be done for two and a half months. I have no need to tell you that the child must be kept at rest in the large plaster, which will not in any way affect his general health, and which is safer, in order to make a good result certain, than to allow him his liberty to walk about with a small plaster stopping above the knee (as some surgeons do). The two and a half months passed, one removes the plaster and alters the position of the limb.



Fig. 830.—1st plaster, 1st (chosen) position, 70, 70 and 0 degrees. Plaster apparatus, seen from below.

Second Plaster, Second Position

The alteration of position is made without chloroform. But, however, if the child is too nervous, employ anæsthesia.

Technique of the alteration from the first position into the second (fig. 831–840). It is a question of bringing the thigh and the leg into the position indicated in fig. 840, p. 763, that is, of putting the lower limb : 1st, in extension in the plane of the table, or almost so (slight flexion of 15°) ; 2nd, in abduction of from 30° to 35° ; and 3rd, above all, in **internal rotation** of from 55° to 60° .

This second position, then, may be formulated in this way :

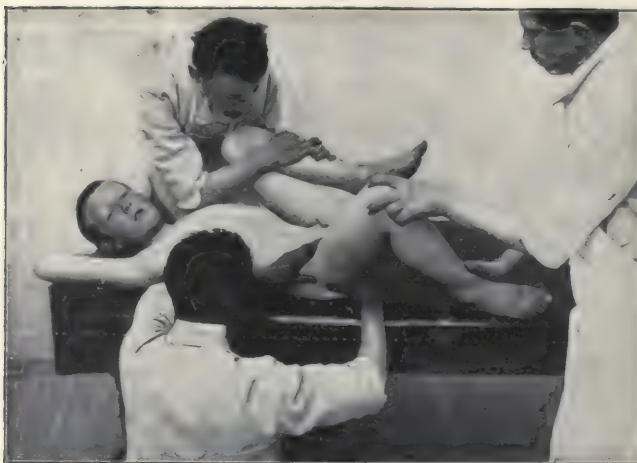


Fig. 831.—Right luxation. The starting point for the alteration of position.



Fig. 832.—While the assistant pulls firmly on the foot and supports the knee (by bringing it very **gently** inwards), you yourself operate upon the **upper part of the femur**, in order to carry it into **internal rotation**. You will proceed **vigorously** and by rhythmic jerks (Right luxation).



Fig. 833.—Left luxation. This is the position with which one is content, too often, for the second and last plaster. It is a *grave fault*: it is necessary to reach a very marked internal rotation (see following figure).

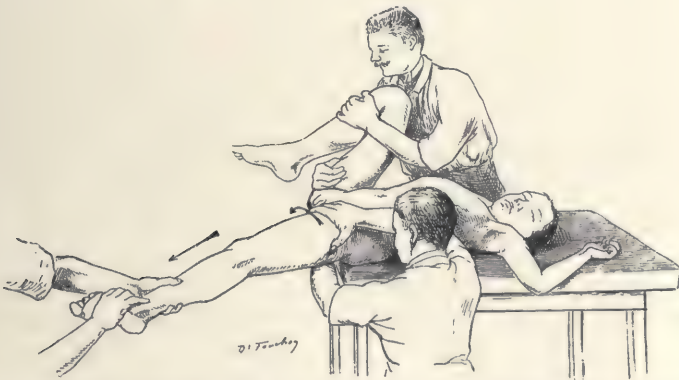


Fig. 834.—Left luxation. How one obtains internal rotation: turn the limb round until one obtains a rotation of from 60 to 65 degrees.

15°; 30°; 60°; namely, 15° of flexion, 30° of abduction, 60° of internal rotation.

There are several ways of bringing the leg from the first to the second position.

But remember only the following (fig. 838, p. 762). The pelvis being immobilised, an assistant makes traction on the foot and lower part of the leg, gradually and firmly, in order to arrive at the undoing of the flexion of the leg, which requires three or four minutes. By the same traction he deflects the thigh also, and brings the back of the knee on to the plane of



Fig. 835.—To explain the **necessity** of making **internal rotation**. The contracted posterior capsule forms, after the first plaster, a posterior, very strong ligament.



Fig. 836.—The necessity for internal rotation (*continued*). If one carries the thigh into abduction **without making internal rotation**, the posterior capsule, being retracted, holds the trochanter to the iliac bone and the head of the femur tilts outside the acetabulum, as shown in this figure.

the table or nearly so, making scarcely 15° of flexion. More than that, in pulling on the foot, he detaches also slightly the head of the femur from the iliac bone, which will prevent the head from striking too forcibly upon the bottom of the acetabulum, in the rotation which one makes it undergo afterwards.

You will reserve to yourself the special rôle of producing internal rotation. The foot being all the while very firmly pulled upon by the assistant, **you manœuvre upon the upper part of the thigh**, not upon the knee, because, in making pressure on the knee, you run the risk of causing a fracture¹ above the condyles.

Turn it round without tiring, until you have placed the **patella**, not only pointing upwards, but facing the **sound side**.

You must know that it will be necessary for you to take 8, 10, and sometimes even 15 minutes, to achieve this.

The thigh brought, at last, to an internal rotation of 60° , you give it 15° of flexion and 30° of abduction.

15° (of flexion), 30° (of abduction), 60° (of internal rotation), that is, I repeat, the formula of the second position.

One preserves the position with a large plaster, which takes in the foot, and that is all, for another two and a half months.

Treatment After Removal of the Plaster

After this, one takes off the second and *last* plaster.

The limb thus set free, the patient continues in the recumbent position.

He will remain so for two or three weeks—the period required

¹ If ever you fracture the bone, you will discontinue the manœuvres, apply a plaster and complete the correction three months later.

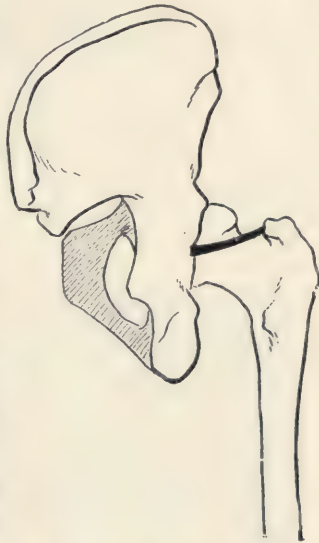


Fig. 837.—One sees **what is necessary to be done** to ensure the result; it is to obtain, by a **very marked internal rotation**, the stretching of the posterior ligament; then the head of the femur will remain in the acetabulum.

for the child to get rid of the stiffness of his limb and to bring

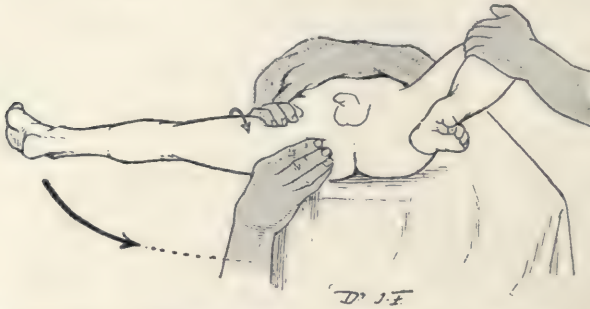


Fig. 838.—Alteration of position ; first, one extends the leg gradually on the thigh, and, in continuing to pull upon the foot, one lowers the knee down to the plane of the table, or nearly so ; secondly, the two hands, grasping the upper third of the femur, impart a movement of internal rotation to it. At a third step, the limb is carried gradually inwards : it preserves, nevertheless, 30 degrees of abduction.



Fig. 839.—The same child as in fig. 816. Radiogram taken after the manoeuvres of internal rotation : it remains to diminish the abduction (see fig. 847).

it back spontaneously to a position nearly normal (fig. 841) ; this you will help by massage of the entire limb.



Fig. 840.—The second position and the second plaster. Here the leg is in extension ; but, as a rule, one puts it in slight flexion (of 15 degrees).



Fig. 841.—Three days after removal of the plaster. The child, on her frame, exercises herself by making movements of extension and flexion of the limb (reduced).

Placing the Child on his Feet and Walking

After three weeks, you will place him on his feet. He will hold on with his hands to a table or to the back of a chair, or to the rails of his bed. Eight days later, he will be able to



Fig. 842.—Placed on her feet: Right luxation. The child keeps her hands supported on a table and makes active movements of the affected leg, to efface the slight degree of flexion and abduction persisting, and to bring back the lower limb to the normal position.

walk round his bed alone, supporting himself by the rails. Afterwards, with the support of two hands holding his own, he will take his first walk in his bedroom (fig. 842 to 846).

Thus supported by two hands, he will walk at first for five minutes every hour, then ten minutes.

After three or four weeks of this régime, one replaces the hand support by that of two sticks (see fig. 497, p. 473) and, a



Fig. 843.—The same after a month of active exercises ; the attitude of the body is almost perfect.

little later, the child will walk alone with a stick (held in his hand on the sound side).

Lastly, two or three months after regaining the use of his feet, he will be able to walk without any support.

He had at first walked very badly, then passably, then well ;●



Fig. 844.—The same. A month later still.

he will finish by walking quite well, and a year after the reduction of the displacement, it will be no longer noticeable ; the cure is complete (fig. 847), the lameness has vanished.

One hastens the return of the flexibility and strength of the leg by massage and baths. The return to the normal condition



Fig. 845.—The same. Photograph taken the same day as that in fig. 843. One can see that the right luxated leg, formerly much shortened (see fig. 780 and 782, photographed before), is now obviously longer than the sound leg.

may, strictly speaking, be perfected without massage, in a child on whom one is no longer in active attendance after removal of

the plaster, but the cure then is made more slowly, and it



Fig. 846.—The same a month later (six and a half months after reduction). The much greater length of the luxated leg has disappeared gradually, the two legs are already obviously equal.

See in the following figure (fig. 847), how the anatomical reduction in this child is perfect.

may not always be quite perfect. We are going to tell you

why in the following pages.¹ But before doing so we must describe the treatment of double luxations.



Fig. 847.—Radiogram of the child represented in fig. 816, 817, and 839.
Radiogram taken seven months after reduction.

B.—TREATMENT OF DOUBLE LUXATIONS (AT 2 AND 3 YEARS OF AGE)

Still more than in the case of unilateral luxations is it necessary to lose no time in the treatment of double luxations, because they will become irreducible still more quickly.

The choice of age for treatment is from 20 to 24 months. The manœuvres of reduction and the positions to be maintained (fig. 848 and 849) and in a general way the details of treatment, are the same as for simple luxation.

¹ See p. 771 to 778.

The treatment of double luxation is made on the two sides at the same time. Nevertheless, the two reductions will not be made on the same day, in every case.

If the first reduction has caused too great a shock, one

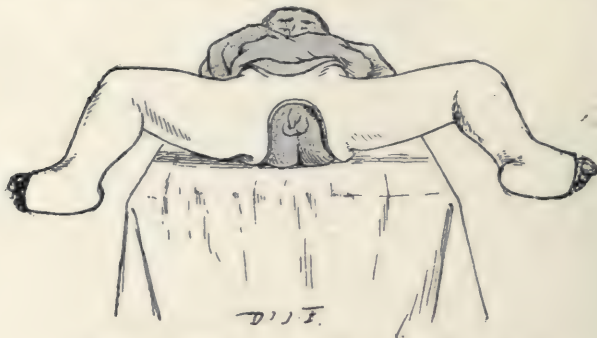


Fig. 848.—The first apparatus for double luxation.



Fig. 849.—A child placed on a very large frame for double luxations; apparatus already removed from the right side (the first treated), maintained in the chosen position by means of a sand-bag placed under the thigh (for 2 or 3 days), before proceeding to the alteration from the first to the second position.

leaves the patient at rest, and one will only make the second reduction 8 or 10 days later.¹

¹ With this in view, I advise you always to commence the reduction on the left side (contrary to what is represented here, fig. 849), in such a manner that the left side may be maintained in the apparatus for from 10 to 20 days longer than on the right side.

I have observed, in fact, that the reduction requires (very often) to be maintained a little longer on the left than on the right.

On the other hand, if the first reduction has been very easy, one may perform the second at the same sitting. As a general rule, the alteration of position and the definite removal of the plaster are made the same day on the two sides.

THE AFTER TREATMENT OF A LUXATION, SINGLE OR DOUBLE

We ought now to return to the treatment which follows the removal of the plaster, and to mention the complications which may occur.

We said that, after doing away with the second and last plaster, the leg, left entirely free, but still at rest for two or three weeks, may return of itself gradually to a correct position ; that is, that one may see it spontaneously undo the abduction, flexion and internal rotation.

Normally and regularly this requires from 1 to 3 months.

Therefore you ought not to be anxious if a certain degree of flexion, of abduction, and of internal rotation persist for a few weeks.

It is better this should be so, and, **if it happen**, you have **nothing** to do, outside what we have already said, with regard to education in walking.

And this will be the usual condition if you have conformed to the technique we have indicated.

But you must know that it does not always happen so, and that the return of the limb to the normal position is made sometimes **too slowly** or **too quickly**, and also and especially, **not correctly**, that the thigh takes on "a bad bend," a bad position, which may, in the long run, compromise the reduction of the head of the femur. This is an awkward complication and will need some special attention, by means of which, I hasten to say it, the reduction will be safeguarded without our having to replace the plaster or even having to retard the placing on the feet and the exercises in walking.

1st. *Possible Contingency*.—The **return of the leg** to the normal position is made **too slowly** ; this is very **rarely** the case in quite young children, of whom we are speaking.

If, two months after the removal of the plaster, you see that a noticeable degree (for instance half) of abduction, of flexion, of internal rotation, still persists, you will proceed to undo them and hasten the return of the leg to the normal.

This is how you would proceed :

(a) **Against persistent abduction** (that abduction easily seen by *the limb operated upon being notably longer than the other*) you will make extension on the sound leg, whilst making pressure on the leg operated upon with a sand-bag placed outside and along it (as for hip-disease with abduction).

(b) **Against flexion** (*which is easily seen by the persistence*

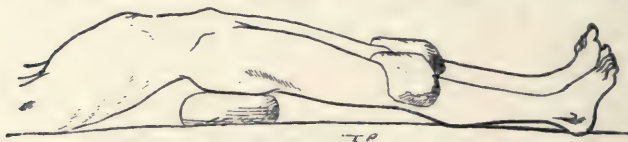


Fig. 850.—The method of correcting the tendency to flexion. The patient being laid on his back, a cushion is placed under his buttocks and a sand-bag on each of his knees.

of a noticeable hollow in the lumbar region), you place the child on his face three or four times a day for half an hour each time, and you will place on both buttocks a weight of from 8 to 10 kilograms, whilst the knees are raised by a cushion : or, the other way about, the patient being laid on the back, you will raise the buttocks and place the weights on the knees (fig. 850), which is a little less efficacious, but, on the other hand, may be continued day and night.

(c) **Against internal rotation** (which turns the patella inwards and makes the child walk badly on the point of the foot), you strive to overcome this by surrounding the limb entirely, from trochanter to toes, with a Velpeau bandage, and fixing it afterwards in external rotation with pins attaching the bandage to the canvas of the mattress (see fig. 852).

These simple means are employed at night and during the day, in the intervals of the exercises—until the result is obtained (about two months).

2nd. *Contingency*.—The **return to the normal** has taken place, or **takes place, too suddenly**; *this is seen more frequently* than the first contingency, in very young children whose joints are not well fixed in the position of the second apparatus.

In this way you will very often see that position lost completely in a few days, and sometimes in a few hours, after the removal of the plaster. In less than twenty-four hours in certain cases, flexion, abduction, and internal rotation have already disappeared.

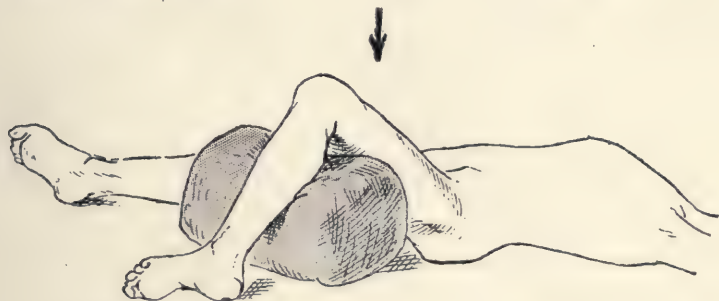


Fig. 851.—Method of combating the tendency to anterior relaxation: replace the leg in the second position of the second plaster and keep it there with a cushion and straps, or some turns of Velpeau bandage, not shown here.

If that is so, this is what you will do; this is how you will contend against the too rapid return to the normal, which should make you fear that the hip, too mobile, too loose, not sufficiently enclosed in the acetabulum, will soon be carried in the opposite direction to that of the second plaster, that is to say, in abduction and external rotation, which will compromise the stability of the reduction.

(a) If the flexion has undone itself too quickly or too completely, for instance, in a few days or a few hours, *which is recognised* by there being not only no lumbar hollow, but **the head pointing in front, at the fold of the groin**, in this

case, I say, you re-establish the flexion of the thigh by placing a cushion beneath the knee in order to raise it (fig. 851), and you preserve this position night and day, postponing for some weeks the first exercises in walking.

(b) If the **internal rotation** has become undone immediately, and especially if a **tendency to external rotation**



Fig. 852.—To overcome the tendency to anterior relaxation, make internal rotation with turns of Velpeau bandage which one pins to the mattress. By sitting the patient half up with cushions placed under his back one may realise that flexion of the thigh is more comfortable than the attitude shown in fig. 851, in order to obliterate the projection of the head at the fold of the groin.

already exists (*which causes the head to point in front* at the fold of the groin and a **little outside** its normal position, at the same time that the *trochanter* ceases to be evident at the external surface of the hip and is *carried backwards*, and even sometimes backwards and inwards, against the acetabulum) in that case the reduction is not maintained with the requisite

accuracy. You endeavour to overcome this tendency to external rotation by a proceeding similar to that which answers in overcoming the tendency to internal rotation (see Fig. 852), that is, you bandage the entire lower limb with a Velveau

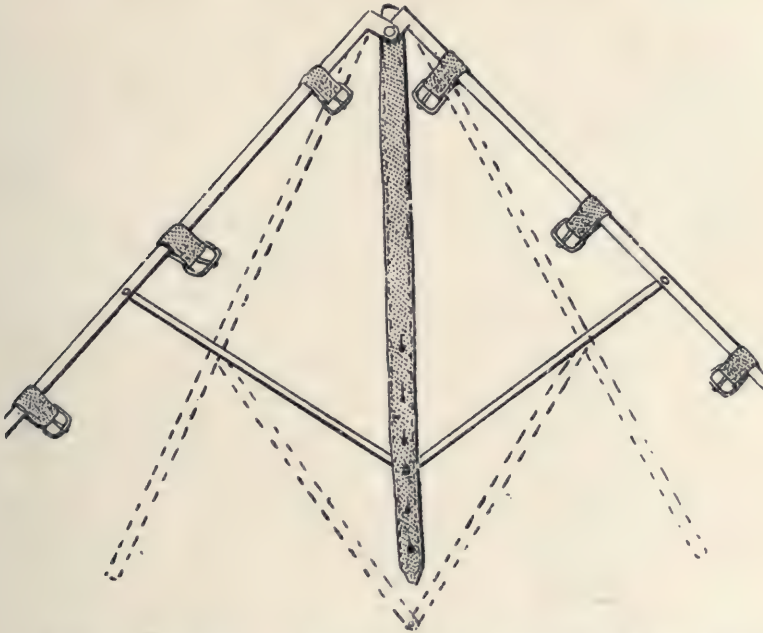


Fig. 853.—A very effective and practicable method, applicable by the parents, for making at will internal or external rotation of the leg during the night (after the plaster has been done away with). Over the leg enclosed in Velveau bandages (fig. 854), one pins from above downwards a strip of canvas. Then, the curtain rod of the bed is fixed to the mattress with four metallic buckles. The leg is drawn towards the curtain rod by three small bandages with buckles attached to the strip of canvas.

This arrangement is applicable to simple luxations as well as to double luxations.

bandage, and fix it in internal rotation with pins holding the bandage to the canvas of the mattress (fig. 852 to 855).

(c) To contend against the **tendency to adduction**, which may in the long run remove the head of the femur from the bottom of the acetabulum (as occurs in coxitis with adduction), especially

when the adduction is associated with external rotation,—
a tendency to adduction which you may recognise, as in coxitis,
 by the limb becoming shortened and *by the great difficulty in*
moving the knee outwards—in order to contend against adduc-
 tion, I say, you fix the limb with pins, as far as possible from

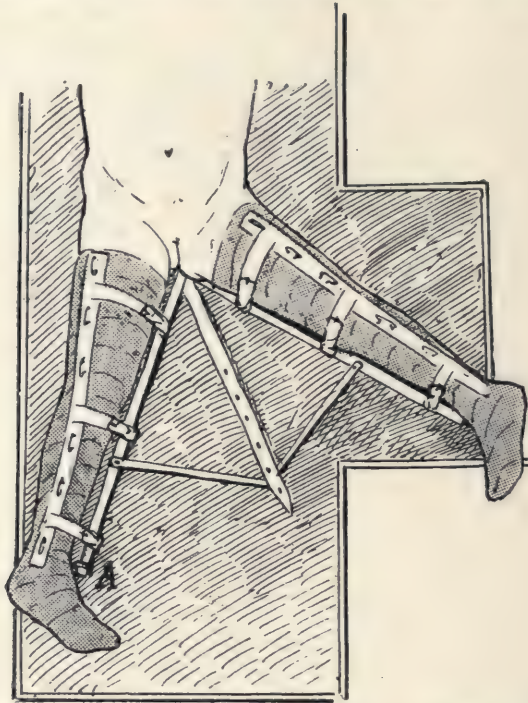


Fig. 854.—The apparatus shown in the preceding figure applied to the patient, who rests on his frame.

One can give to each limb whatever position one wishes. The external rotation and abduction are, here, very marked on the left and almost absent on the right.

the median axis of the body—or make use of the arrangement shown in fig. 855.

One may, with care, attain at the same time the triple objective of carrying the leg into flexion, abduction and internal rotation by giving it the position indicated on p. 773, fig. 851.

One succeeds in this way in opening up the acetabulum and in retracting the anterior capsule. There one has a first means of attaining the end, which is that of improving and perfecting the reduction.

But there is a second means, still better, of attaining this objective ; it is to carry the thigh at first into flexion at 90° , then, from there, into abduction as far as possible (see fig. 856), that is, instead of replacing the limb in a position similar to that in the second plaster, one places it in a position near to that of the first plaster ; one arrives, by this method, at some excellent results.¹

This second manœuvre, this

¹ One can understand how this position corrects the tendency to adduction and hyper-extension of the thigh. But one sees less easily how it corrects the tendency to external rotation. Well, this is how it is. Without taking into account that which one contributes in lengthening the adductors, which are slight rotators outwards (Duchenne of Boulogne), one arrives at it especially because one retracts the anterior capsule with the flexion made, and one increases the hollowing out of the acetabulum by the abduction. But if one flattens the head against the acetabulum, and if one forces it inwards, one prevents by so doing its being replaced in external rotation, which could only happen by the head becoming slightly disengaged from the acetabulum.

In other words, the more we make the reduction perfect (and one arrives at it more quickly and better by the second method) the more we shall be protected, not only against a posterior luxation, but even an anterior luxation (of which the tendency to external rotation is only the first degree).

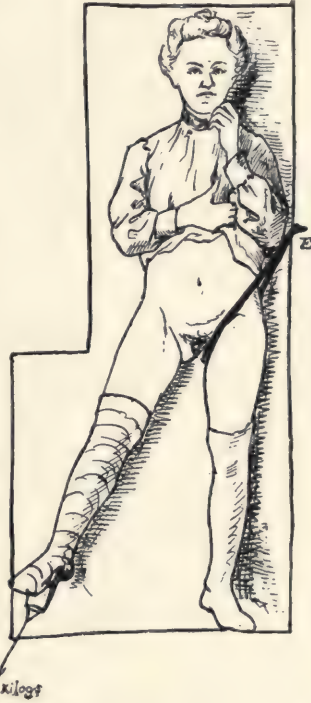


Fig. 855.—Method of correcting the tendency to adduction (continuous extension of from 8 to 12 kilograms, with a perineal band for counter-extension on the sound side). One has the frame enlarged on the side of the luxation.

second position, is, then, more efficacious than the first. It has only one other inconvenience, that of puzzling the parents. They at once imagine that if you return to the first position instead of retaining the second, it is because you have been "unsuccessful," which is not so.

It is, indeed, not unsuccessful, yet warn the parents against this impression, as to which they cannot help themselves; it is necessary for you to mention, *before removing the second plaster*, that you have to give to the leg, for some

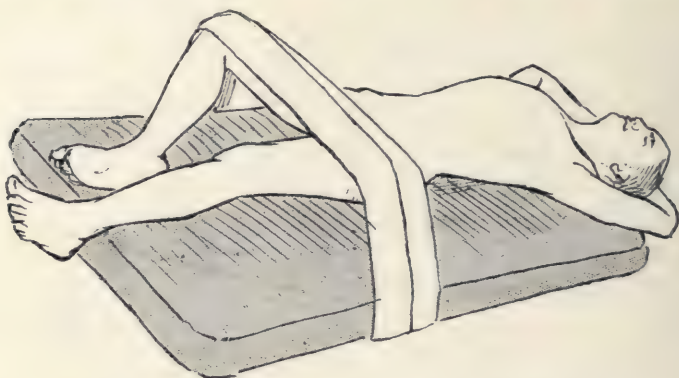


Fig. 856.—To overcome the tendency to posterior relaxation, fix the leg at night in forced abduction (that is, in a similar position to that of the first plaster) with some turns of Velpeau bandage passing round the frame on which the child sleeps. A new bandage of elastic crêpe added each evening increases the degree of abduction. One carries this gradually to 80 degrees, and even 90 degrees (after having flexed the thigh at 90 degrees).

weeks, sometimes the position of the first plaster, at others that of the second position, according to the indications for the time being.

You will thus reassure them beforehand, by adding that this will be done with Velpeau bandages (see fig. 856) and no longer with plaster, as in fig. 857; which will not delay in any way the placing of the child on his feet and taking exercise in walking.

Moreover, you will commence by using the first method, which often suffices, and you will not return to the second for some

days later, when the first operation has not given you entire satisfaction, that is, when the most internal point of the head rests distinctly **outside the artery** (instead of being found, as in the normal position, under the artery and even slightly inside it).

Duration of the Treatment.—You will preserve this position (always without prejudice to the walking exercises) for from six to eight weeks.

Then you leave the leg to return of itself to the normal position. According as, this time again, it returns too slowly or

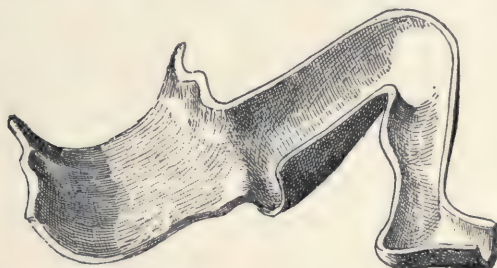


Fig. 857.—If the head moves a little and the excavation of the acetabulum should appear insufficient, one replaces the child for a few days, or even only for a night, in this splint. One keeps it in position with a muslin bandage.

too quickly, you will encourage, or you will counteract anew, its return in the way indicated at the beginning of this chapter.

We may add, to make this clear, that if a **genu valgum** or a **genu varum** supervene, it would be easy for you to overcome it with a wooden splint and some turns of Velpeau bandage, or, if need be, a plastered knee-piece kept on for several weeks, and with that the child might continue to walk (see p. 613, fig. 656).

Active Exercises

With regard to active exercises, there is nothing, or not much, to be done, apart from walking exercise, in very young children who understand imperfectly what is required of them.

In older children, they are easily made to start at the

word of **command**, with the leg outwards, backwards, in external or internal rotation, etc. But for the very young, rely almost entirely on the passive manœuvres already described.

We have intentionally not spoken of **mobilisation of the hip : you will never use this**. Its movements ought to return and will return quite of themselves.

Results of the Treatment of Congenital Luxation

The results to-day are marvellous (see fig. 858 and 859, 793, 794 and 847).

Ten years ago they were quite lamentable. We obtained scarcely once in ten times a durable reduction, and in all the other cases one had a relapse, especially forwards, that is, an anterior re-displacement.

But to-day success is a certainty, one may say, when one operates on children of six or seven years of age.

And one will soon arrive, thanks to greater experience,¹ at having a whole series of 100 cases without a single relapse.²

¹ My own covers already over 2000 congenital luxations ; see, for details of Results and Statistics, my book on "*La luxation congénitale*" (Masson), Chap. XV., p. 228.

² Here are the **difficulties** and **complications** possible during or after reduction, possible, but extremely rare (refer to the same Chap. XV. of my book on "*La luxation*"):—

(a) *Operative Shock?*—Not to be feared, provided that your anaesthesia is well looked after (see Chap. II.) and that your manœuvres of reduction do not exceed 15 minutes for children of less than five years, and from 20 to 30 minutes for older children.

(b) *A fracture?*—See the notes on p. 761 and 793.

(c) *A paresis or paralysis?*—Without its being imputable to any fault in technique, one may, strictly speaking, under exceptional circumstances, after some very arduous manœuvres of reduction, **in old or very obstinate luxations**, notice, on the patient awakening, a paralysis of the leg, which is generally incomplete and localised in the foot. Fortunately, it always yields, I believe, to the galvanic current (see p. 669) together with massage, baths, and combined active and passive exercises. Cure is effected in from 3 to 10 months.

According to observations reported up to the present day, the paralysis has only retarded the functional cure of the patient.

Rest assured that one never observes paresis, even temporary, under 6 or

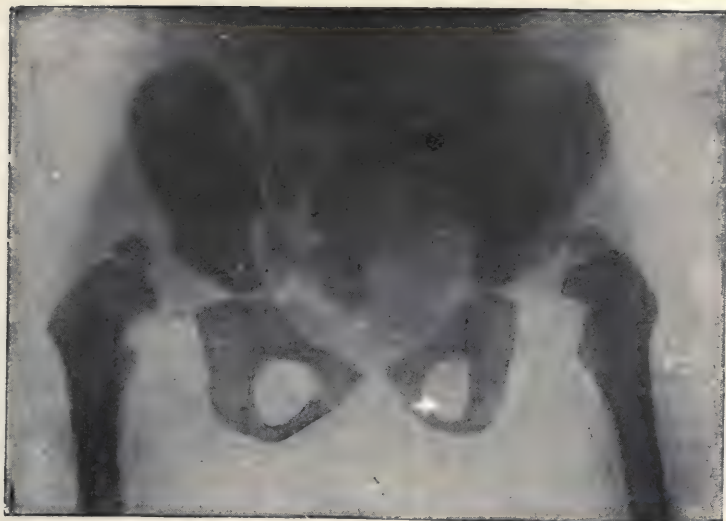


Fig. 858.—Double congenital luxation.



Fig. 859.—The same 8 months later.

We have already obtained, on our own account, three such series—100 cases in succession, without a single relapse—just as a good number of surgeons are able to produce whole series of 100 cases of radical cure of hernia or of simple ovariectomies, two operations which formerly, like the treatment of luxation, produced so many failures and which to-day are always successful.

II.—TREATMENT OF LUXATIONS OF MORE THAN 5 OR 6 YEARS' STANDING

We have seen that one succeeds immediately in reduction *without any previous preparation*, when it is a question of a luxation of two or three years' standing. But that is not usually so in luxations which have reached eight, nine, ten, and twelve years' duration.

Before indicating the course to be followed in dealing with these difficult cases, we will rapidly recall the nature of the obstacles to be overcome. The obstacles are three in number :

1st. THE ELEVATION OF THE HEAD OF THE FEMUR in the buttock, where it is held by muscular or tendinous contractions and shortenings, and sometimes by adhesions of the capsule to the periosteum of the iliac fossa.

2nd. THE SHRINKING OF THE CAPSULE at its middle or at its internal part (see fig. 860 and 863).

3rd. THE PARTIAL CLOSURE OF THE ACETABULUM by the capsule (fig. 862 and 863).

You will overcome the two latter obstacles here (as in cases of 7 years of age (simple luxation) and 4 or 5 years (double luxations), **the only cases you non-specialist practitioners ought to treat.**

(d) A *reluxation*?—In this case, you perform the reduction again (see p. 795).

(e) *Bullæ*, *bedsores*, or *nutritional troubles* of the toes or of the foot?—To avoid these, it is necessary to inspect the toes very often (colour, temperature, sensibility) for some days, especially in cold weather. If anything suspicious occurs, split the plaster in front up to the knee, separate the sides, and proceed in the way described on p. 62. If necessary, you remove the plaster from the toes to the calf, and replace it by a slightly compressive wool dressing, permitting of frequent and complete examination.

very young children), on the day of the operation, by the special manœuvres for reduction, moving the head of the femur for some time and in a variety of ways, in all directions, against the narrow shrunken capsule, so as to widen the opening (fig. 864 and 865). One succeeds in effecting this almost always in children up to twelve or fifteen years.

But the first obstacle mentioned demands, in order to overcome it, a special **pre-operative treatment**.

Indeed, at six, seven or eight years, this pre-operative treatment may be carried out there and then, at the beginning even of the sitting for reduction, by manœuvres of **forcible traction**, under chloroform, obviously. But after a certain age, about eight or nine years, it is usually advisable, and always extremely useful, to make, **at a longer or shorter time before** the day of the operation, a *continuous extension* of the leg.

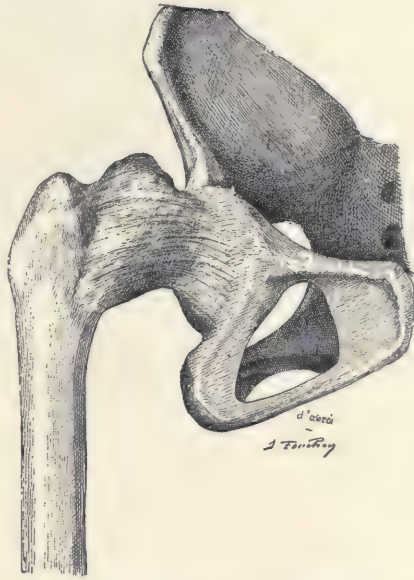


Fig. 860.—Shrinking of the capsule between the head and the acetabulum. Exterior view.

Continuous Extension

The **duration** varies from several weeks to several months, and its **amount** from 5 to 20 kilograms, according to the age of the child, the degree of **shortening**, and the **variety** of the luxation.

This continuous extension should be less, for instance, in children of from seven to eight years of age, and in the case

of shortening of less than 3 cm., or in luxations of the **anterior or supra-cotyloid variety**, that is, where the **head** is in **front** of the **acetabulum** or **directly above it**.

Extension will be much more serious in the opposite conditions; the child older, the shortening greater, or the luxation of the **posterior variety**, that is, where the **head** is **behind the**

acetabulum and the trochanter a little in front (the femur having undergone in these extreme varieties a movement of internal rotation).

We described, on p. 413, the method of making extension and counter-extension.

As to the measure of its duration, one continues it until the upper margin of the trochanter is not more than about 1 or 2 cm. out of Nelaton's line (fig. 866). [See my book on **Congenital Luxation**, p. 71, Masson.]

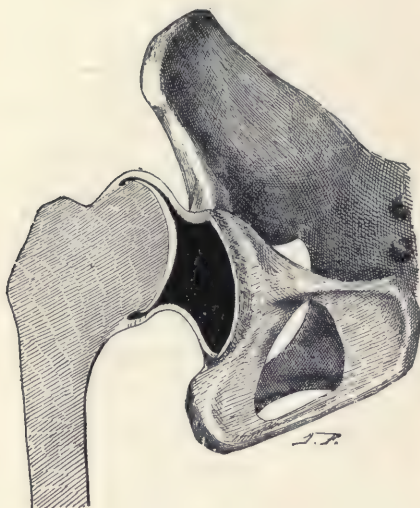


Fig. 861.—Interior view of the shrunken capsule.

Extemporary Forcible Extension

This is done, as I said, at the very beginning of the sitting for reduction.

Its Technique.—One uses a windlass and tackle.

Counter-extension.—The patient is held by a hank of wool passing round the groin on the luxated side and fastened by a cord to the wall (fig. 867 and 868).

Extension.—Other two hanks are slipped round the ankle: the loops of the other hanks are superposed and

the two knots are placed one above each malleolus, to distribute the force of the traction equally between the two sides of the limb.

One includes a **dynamometer** between the hook of the tackle and the hanks, joined one to the other by a cord.

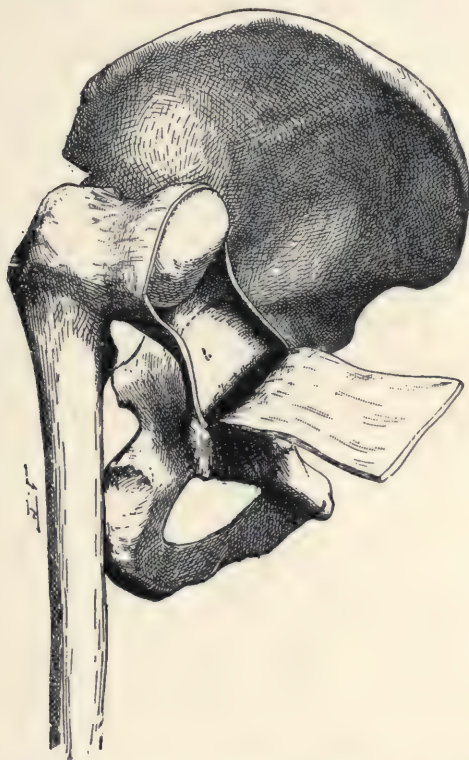


Fig. 862.—A case of luxation in my own practice of ten years' standing, where the orifice of entrance to the acetabulum was exceptionally narrowed. The anterior capsule, very retracted, has transformed the orifice into a button-hole so narrow that it was impossible to admit the head of the femur. We were obliged to have recourse to surgical operation (see further on, p. 818).

One makes traction up to **80, 90, or 100 kilograms**¹ for **five, eight, or ten minutes.**

After which, the entire apparatus is removed, and one

¹ Above 150 kilograms may entail a slight risk of paralysis. See note 2, p. 780.

sets to work to stretch or rupture the adductors, as has been explained above (see p. 737) in order to pass on afterwards to the reduction itself.

Let us recapitulate. Before reduction, one ought to make the following **preparatory** manœuvres :—



Fig. 863.—The same during the attempt at reduction (diagram).

(a) For children of from 5 to 9 years (with slight shortening, with the head of the femur placed in front of the acetabulum, or quite against the anterior superior iliac spine); 1st, extemporary forced extension, of 60 to 80 kilograms, for 8 minutes; kneading of the adductors. Preliminary continuous extension is not indispensable here.

(b) For children slightly older, or with great shortening, or with the head of the femur backwards in the buttock, some distance from the antero-superior iliac spine: 1st, continuous extension of from three weeks to three months, and of from 8 to 15 or 20 kilograms (according to the age and the shortening); 2nd,



Fig. 864.—How the reduction will become possible in cases slightly less obstinate than the preceding. The action of the head in the manœuvres has gradually transformed the linear slit into an orifice sufficiently wide.

extemporary forced extension of from 80 to 100 kilograms for ten minutes; 3rd, rupture of the adductors.

Reduction

The manœuvres of reduction do not differ from those we have described in the easy cases of younger children (see p. 741); but here, you will insist more on employing a longer

time and greater force,—you being assisted by two or three strong assistants.

There should be two in order to act upon the thigh and knee, and also two (you will employ four thumbs instead of two) in order to act upon the head of the femur and push it towards the acetabulum.

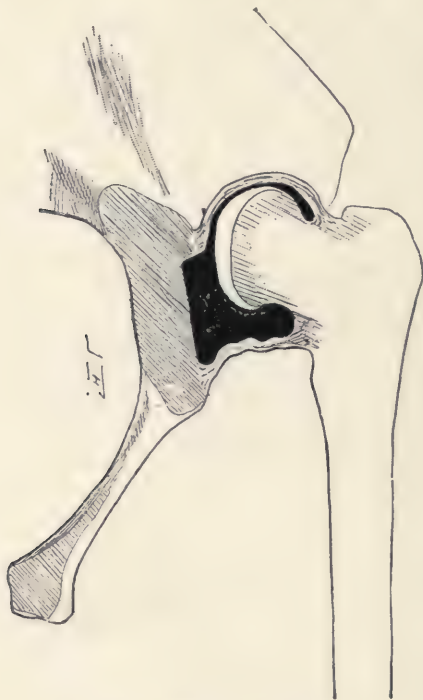


Fig. 865.—The same (diagram).

One understands that it is impossible to express the manœuvres in fixed mathematical formulæ. We can indeed give only some useful directions and indicate those manœuvres which have already been proved of value in hundreds of cases.

The three typical manœuvres (see p. 741), you will know how to modify and vary them in the course of the operation,

according to circumstances, as you do when you have, for instance, a rather difficult dislocation of the shoulder to reduce.

Here is a variant, a fourth manœuvre, sometimes useful in certain cases of malformation. One begins, not by flexion of the femur at 90° , but with a still stronger flexion— 110° , 120° , 130° —and one passes from that to a similarly forcible abduction of more than 90° ; that is, one carries the knee below the plane of the table, at the same time towards the axilla.

If you do not succeed after trying successively the four methods, recommence very patiently the whole series.

I have in this way seen the first manœuvres succeed when repeated, after the three others had been tried in vain.



Fig. 866.—Depression of the femur effected by continuous extension. The dotted line represents the old relations of the head and of the trochanter with Nelaton's line; the plain lines represent their actual relations after extension.

These attempts may be **prolonged**, without hesitation, for **half an hour** (except the forced extension). But **I do not advise** you to **exceed** this limit; they may cause, by persisting further, too violent a shock to the patient.

If you have made no progress after half an hour's efforts, discontinue them for the time being. The patient should be replaced in continuous extension for two months longer.

Then you will recommence. If you are disappointed the second time, you will give up the reduction by orthopædic methods.

There is nothing to add to what has already been said, in the easy cases, *as to the diagnosis of reduction, the position in*

which it is necessary to support the patient and the alteration from the first into the second position.

Nevertheless, *à propos* the position to give in the first plaster

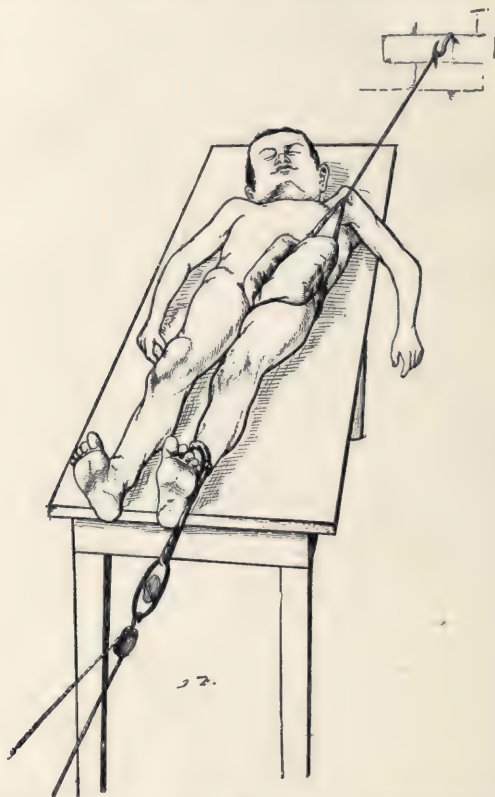


Fig. 867.—Forced extemporaneous extension. 1st. The **counter extension**; a hank is placed at the root of the limb (protected by a cushion of cotton wool) and is attached to a hook fixed in the wall, behind the patient. 2nd. The **extension** with another, or, better, with two hanks, applied as a clove hitch round the ankle.

on the day of the reduction, it is necessary for us to note here that there is such a case, exceptional of a truth, where the reduction is not preserved if we give to the femur the classic position, the best position, which is, as you know, 70,

70 and 0,—70° of flexion, 70° of abduction, and 0° of rotation.

It does not “hold,” the head does not remain in the aceta-

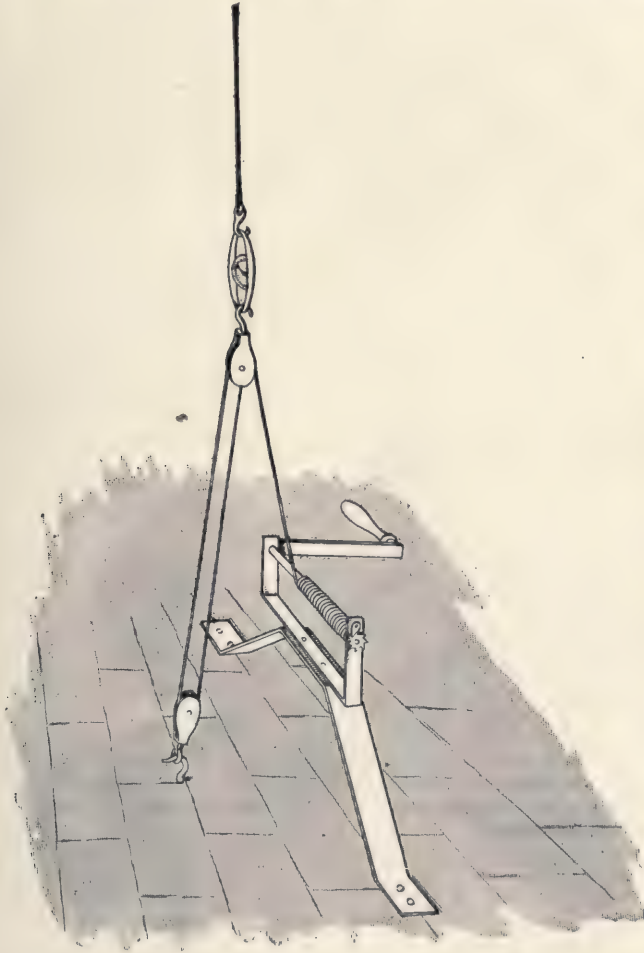


Fig. 868.—Our apparatus for extemporary extension with its tackle, its windlass and its dynamometer.

bulum unless we place the femur in a **forced** flexion and abduction at 90° or more, that is to say that the knee ought to be raised towards the trunk, and, at the same time, carried

below the plane of the table, as in the manoeuvre figured here (fig. 869). It is, then, "*a position of necessity*" which we are obliged to adopt, but which we only adopt for the time being.

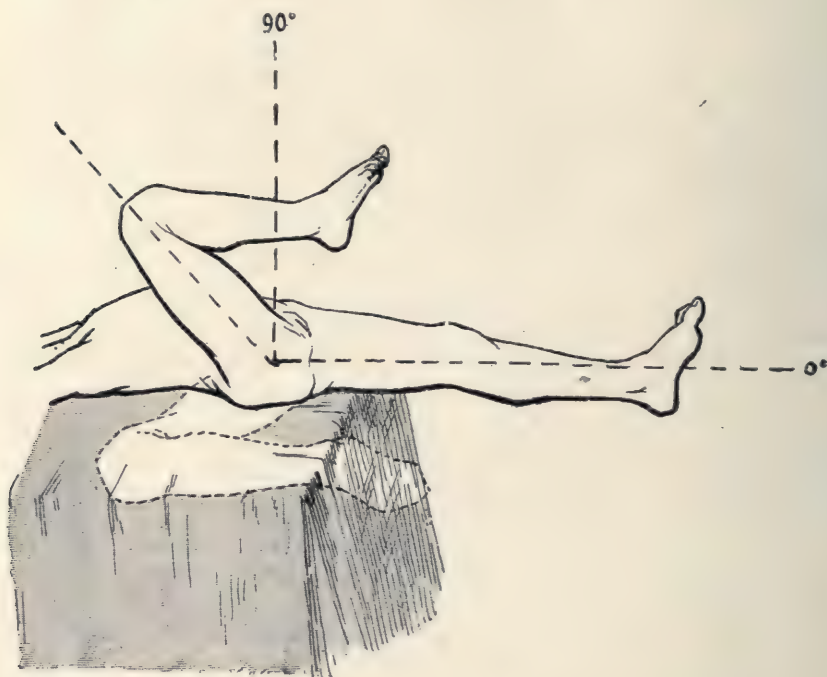


Fig. 869.—Forced flexion of the thigh in abduction in a transverse vertical plane, parallel to the vertical transverse plane of the acetabulum, where one sees the track followed by the right thigh in order to arrive at this position of forced flexion and abduction.

We fix the thigh temporarily, in a plaster, in this attitude—the only one where it "*holds*"—for about three weeks.

But we do not preserve this position longer than is necessary for the head to be slightly fixed, at a point very near to that where it ought to be; this **period will not exceed three weeks.**

After that, we place the thigh at 70° , 70° and 0° , the best position, the ideal position, in which this time it "holds"; and from this time the hollowing of the acetabulum will be

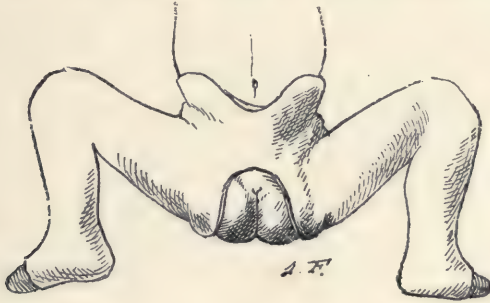


Fig. 870.—Position of necessity (temporary); forced flexion and abduction. The knee in forced flexion—more than 90 degrees, and forced abduction—more than 90 degrees—below the plane of the table and against the flank (see also fig. 825).

made under very good conditions. There will then have been a delay of three weeks only—in this very bad case—in arriving at a perfect cure.

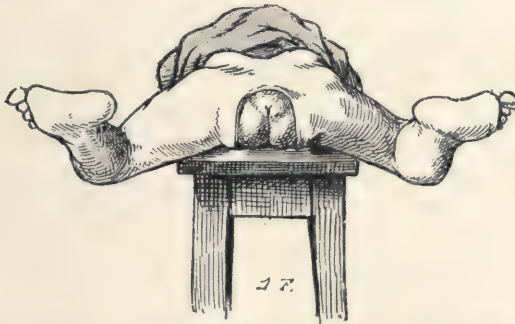


Fig. 871.—Position of necessity. Knee below the plane of the table, to show the forced abduction (wrongly called hyper-extension).

After-Treatment.—This does not differ essentially from that which we have indicated for very young children. But here, in children of more than six years of age, one may obtain much from well-directed movements and *active exercises*; several

times a day, one makes the child carry the limb in the different directions indicated in each case, that is, in directions opposite to the vicious attitude it has a tendency to take.

From one to two years after the day of the reduction, the functional result is achieved. It is not always so perfect as in very young children. It may happen, in an unilateral luxation reduced after seven years, that a certain amount of stiffness of the hip persists, and we ought to add that this is the rule for bilateral luxations above that age.

Combat this stiffness by massage, baths, and active exercises, but rely more **upon time**, to overcome it, and learn to **resist** the very natural **temptation to effect forced mobilisation** of the joint. You may in that way do more harm than good (from the point of view of return of movement).

Bilateral Luxations at upwards of Five Years of Age

The treatment of the two luxations will be carried out on both sides **at the same time** (see p. 769); but the two reductions will not generally be made on the same day. One allows an interval between them of from 15 to 20 days.

Their Prognosis.—They are, as you know, more difficult to reduce than unilateral luxations. A bilateral luxation of four years' standing presents as many obstacles to reduction as an unilateral luxation of seven years; and a bilateral luxation of six years' standing gives as much trouble as an unilateral luxation of nine or ten years.

Therefore, for double luxations, the age limits indicated for the treatment of simple luxation ought to be lowered by at least two or three years, all things being equal.

Scarcely ever treat double luxations at seven years of age—especially you, practitioners not specialists.

Past that age, you would have a poor chance of reducing them, and your functional results would be too often imperfect, in the sense that you would see an articular stiffness persist in your patients, so troublesome as to render walking defective.

RELAPSES AND RELUXATIONS

We have indicated the technique which should lead to real and durable reductions.

We have also mentioned, *à propos* after-treatment, the methods of improving and rectifying the reduction, when it has not remained perfect after removal of the plaster.

But it would be rash, however, to hope that you will never have a relaxation.

1st. Because a case may occur where the conformation of the bone may be so defective, or the hollowing of the acetabu-



Fig. 872.—Tendency to anterior relaxation.



Fig. 873.—Anterior relaxation. 1st degree.



Fig. 874.—2nd degree. Moreover, the femur has been raised.

lum so slow, that relaxation will be very easily produced. Be reassured, however; it is quite an exceptional case, and one may say that there scarcely ever exists a luxation where one cannot, with a good technique, place a relapse out of the question.

2nd. Especially for this exceedingly simple reason, which will always hold good, that . . . *errare humanum est*; we are none of us infallible, and in spite of everything, in spite of the error being theoretically avoidable, one will commit, some time or other, in practice, a technical fault not recognised or not repaired in time.

ANTERIOR RELAXATION

This is the most frequent variety of relaxation.

One may distinguish **three degrees** (fig. 872 to 874) :

(a) Head **forwards** and **inwards** (its centre is within the antero-posterior plane passing through the middle of the trochanter) ;



Fig. 875.—To show that the transmission of the weight of the body is not through the head, but solely through the posterior angle of the trochanter supported upon the acetabulum.



Fig. 876.—Slight anterior relaxation.

(b) Head **directly forwards**, or even in the same antero-posterior plane as the trochanter ;

(c) Head **forwards and outside** the trochanter—in which case the head is felt under the skin on the external surface of the hip—whilst the trochanter is placed backwards and inwards, quite close to the acetabulum.

More than that, in every relaxation the head is a little raised upwards (see fig. 878 and 879).

The Course to be followed in a Case of Relaxation

(a) If it is a **relaxation of the third degree**, do not hesitate ; a new reduction under chloroform, is always necessary.

(b) If it is a relaxation of the **first or second degree**, the



Fig. 877.—Anterior relaxation. 3rd degree: the support is worse here than in fig. 875, being given the exaggerated degree of rotation (external) which becomes more and more accentuated.



Fig. 878.—Another type of grave anterior relaxation. The osseous support is almost nothing; it is a hip nearly in the form of a flail.

course **differs** according as the relaxation is **recent** or of **old standing**.

1ST CASE.—*The relaxation is recent* (of a few weeks' duration).

One will make use of the mild measures indicated in p. 771. In luxations of the first degree, one employs them only at night. For the second degree, one employs them day and night, for three or four months. This treatment, if it be well carried out, will nearly always effect a cure. If it fail, have recourse to a fresh reduction.

2ND CASE.—*The relaxation is already of old standing (6, 9 or 12 months, and more).*

Let us say at once that **the first degree** (very often), and **the second degree** (sometimes), are compatible with **very correct walking**.

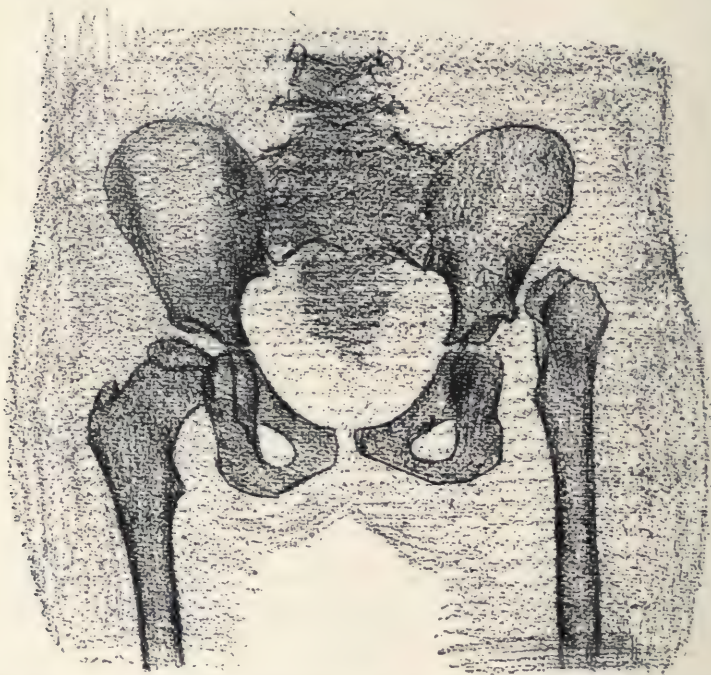


Fig. 879.—The deformity consecutive to the first treatment is here very marked ; the great trochanter is situated manifestly higher than the head, hence an accentuated degree of coxa vara which will render the treatment of this relaxation difficult.

If, then, you see that the **lameness is insignificant**, and that it is **diminishing**, **you will confine yourself**, for all treatment, to making at night, a firm internal rotation, in the manner described in p. 774. By day, the child continues to walk.

If it is a question, on the contrary, of a relaxation bringing

with it a **very appreciable lameness, which does not diminish**, you ought to submit it to **a new treatment** (*new reduction and new plaster*).

For one does not succeed, in luxations already of long standing, in bringing the head forwards by simply employing bandages. The head refuses to leave the place it is in, being retained on the outside and above by powerful ligamentous adhesions.

You must of necessity, in order to allow the head to return to its normal place, soften and stretch the ligaments previously (it is especially the posterior part of the capsule which is shortened and retracted), and the result will only be obtained by manœuvres made under chloroform.

The Treatment of an Anterior Relaxation

The technique differs according as one is treating a relaxation of the first or second degree, or a relaxation of the third degree.

A.—Relaxation of the First or Second Degree

In the first case, the manœuvres are similar to those described for the first treatment—similar, but not identical. These are the differences.

Whilst for the first reduction, it is sufficient to carry the femur into a flexion of 90° , it will be necessary here to push such flexion up to 120° , 130° , and sometimes more, to the point where the bent knee will become lodged in the axillary region.

Examination of the illustrations (fig. 880 to 885) will show you the necessity of reaching this extraordinary position, if you wish to return the head of the femur to the acetabulum.

But, in order that the head of the femur may allow itself to be brought into this extreme flexion, it is evidently necessary that the joint should not have been stiffened by the first treatment, or, at least, that it has had time to recover its suppleness. If not, in wishing to “force” the flexion, one would surely cause a fracture.

This shows that it will be necessary to retard the reduction

so long as the joint remains stiffened, and that it will be necessary to give it time to be loosened.

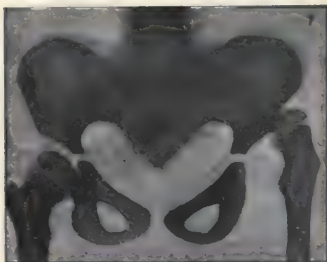


Fig. 880.

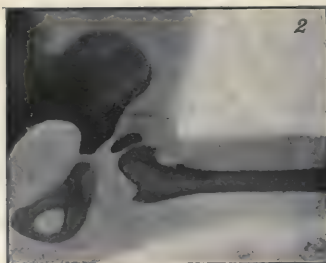


Fig. 881.

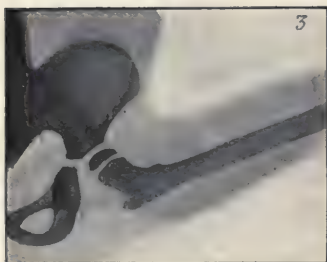


Fig. 882.

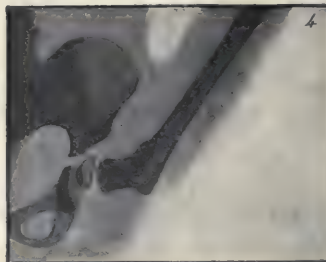


Fig. 883.

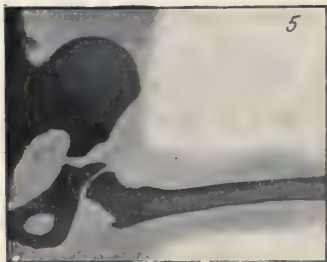


Fig. 884.

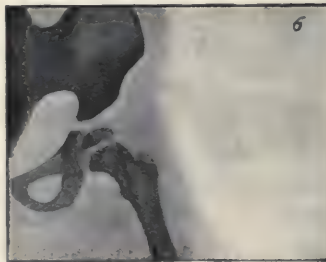


Fig. 885.

Fig. 880 to 885.—1. Relaxation. 2. If one confines oneself to placing the femur in flexion and abduction at a right angle, the reduction is not obtained. 3. In order to obtain it here, one is obliged to **force the flexion** of the femur. 4. It is necessary even to raise the knee towards the axilla, to perfect the reduction; this is the first position (see fig. 886). 5. The second position. 6. The third position.

Do you wish to know at what moment reduction may be attempted, without the risk of fracture? Examine the degree

of movement in the joint. Try, with or without chloroform, to flex the thigh, by proceeding with method, and very gently. If you are able to arrive easily at a right angle, the patient is ready for reduction.

On the other hand, if, in your attempts at mobilising, you are arrested almost immediately by the resistance of the peri-articular structures, do not persevere, postpone the reduction for one or two months.

In the meantime, bathe and massage the child, and leave him entirely free of all restraint, keeping him, however, on his frame, if he is not allowed to stand ; while, if he already walks, you will allow him to continue his walking exercises.

When, two months later, you make a fresh examination, you will find, this time, that the hip has recovered its normal suppleness (or nearly so).

The patient is ready for the reduction.

The Reduction of a Relaxation of the First or Second Degree

This will be done under chloroform.

One commences by a kneading of all the peri-articular muscles and by rupture of the adductors ; brassage and rupture which will be performed in the way described on p. 737.

Then one carries the femur into a flexion of 90° , and from there outwards, gradually to 30° , 40° , 50° , 60° of abduction.

When you reach 70° , or 80° , or 85° , suddenly there is a slight snap, a jerk, and the reduction is done.

Up to that time there is no difference between this reduction and reduction in the first treatment.

But when one is dealing with a relapse, very often no snap is produced with 90° of flexion. Then, push the flexion still further, by slowly carrying the knee towards the axilla, also increasing slightly the abduction : the snap will not be produced always, however. There remain cases where the characteristic snap and jerk will not be perceptible at any time, whatever be the degree of flexion and abduction which you bring to bear on the thigh.

Do not be too concerned at this. The cure will be obtained even then, and the opening up of the acetabulum also, provided that you immobilise the thigh in the axillary position (of flexion at 130° or 140° , and abduction at 90° or 100°).

And in the other cases also, those in which such sound is produced, you will give the same position to the thigh as for the application of the plaster (fig. 886).

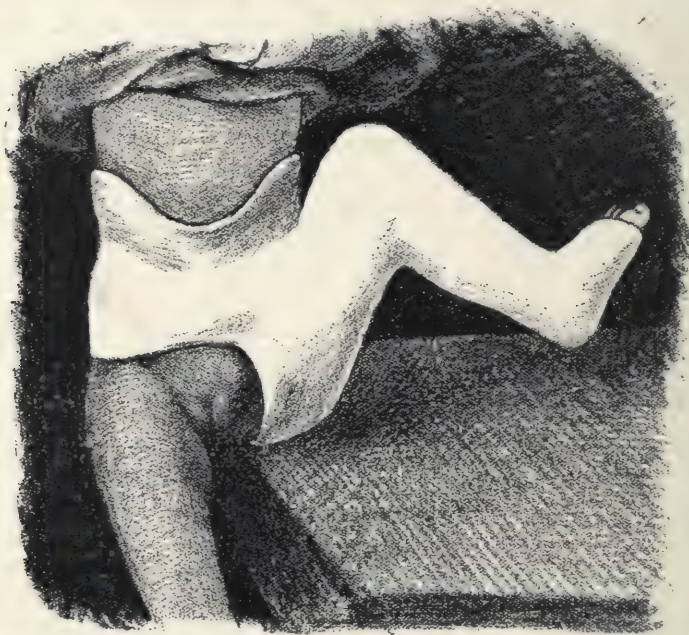


Fig. 886.—The first position after the reduction of a relaxation. The knee is again carried towards the axilla (axillary position).

The treatment, one must admit, must be very carefully conducted.

If you have a radiographic installation, verify at each step where you are; it is the only means of proceeding safely (see fig. 880 to 885).

At each step of the treatment, you should take a fresh radiogram, either at once (before applying the plaster), or the next

day or the day after that, through an opening made in the plaster apparatus—an opening which you can immediately close up again with a simple plastered bandage.

The steps of the treatment are three in number, and not two only, as in the first treatment.

The Treatment after Reduction.

It would be imprudent to wish *a return* all at once from the axillary position of the first plaster to the second and last position of the first treatment. One would in that way risk the undoing of the reduction.

It is always wise, and it is even very often indispensable, to adopt an intermediate course, that is, to make 3 plasters and 3 positions (altogether), in place of 2 plasters and 2 positions, as in the first treatment.

Accordingly, two and a half months after the reduction, a second apparatus in a flexion brought back to between 80° and 90° (see fig. 884 to 885), in an abduction slightly diminished (reduced to about 70°).

You see that this second position is nearly the first position of the first treatment.

Then, two and a half months afterwards, a third and last plaster, which corresponds to the second and last position of the first treatment.

Thus the entire treatment of a relapse lasts two and a half months more than the treatment of a luxation which has not yet been treated.

The Results.

They are very satisfactory. Nevertheless, one is not able to promise, when one is dealing with a relapse, functional results as perfect as when one is dealing with a luxation not yet treated. We are in the habit of saying that a luxation, unsuccessful at the first treatment, is a hundred times more difficult to cure, and **to cure well**, than a luxation which has previously had no treatment.

And I believe that such a second attempt at a cure should always be left to experienced specialists.

If this be true for a relaxation of the first two degrees, it is still more so for a relaxation of the third degree, of which we are now going to study the treatment.

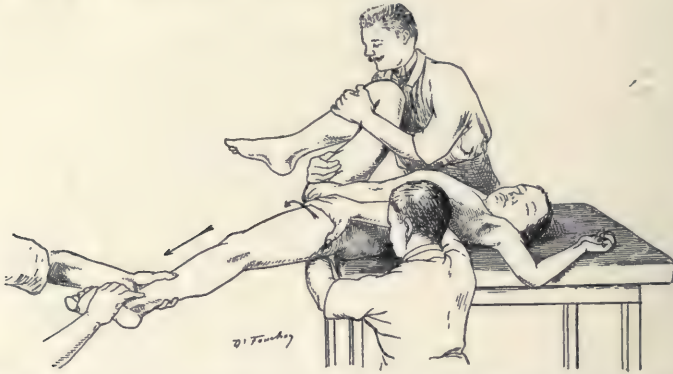


Fig. 887.—Correction of a relaxation of the third degree. The pelvis is immobilised by an assistant; a second assistant, grasping the thigh a little above the knee, imparts to the femur slight movements of internal rotation, placing it in slight flexion and abduction. But it is the surgeon who ought especially to perform the internal rotation by applying all his strength, with his thumbs placed behind the trochanter, and his index finger over the head of the femur.

B.—Reluxation of the Third Degree

Here you foresee, from the lesions which characterise the third degree, that the reduction will not be made by manœuvres on all fours with those of the first treatment.

For that which dominates in the third degree is the rotation outwards of the head of the femur (fig. 886); and that which increases still more the difficulty of reduction is the notable aggravation, under the influence of the first treatment, of the original anteversion of the head and neck.

What will it be necessary for us to do in order to return the head to its place?

It is necessary, **above everything**, to make the femur describe a movement of **internal rotation**. The result is

obtained by a long sitting of gentle and gradual mobilisation of the thigh, made in the direction of this internal rotation (fig. 887) and in the course of which one will have to take care not to forget for a single minute that the vicious position of the femur is maintained by a **very strong posterior ligament**, produced and represented by the contraction and hardening of the posterior capsule.

One will **not** attempt, then, to bring the femur inwards **violently**; one would only succeed in breaking the bone.¹

This is the technique (fig. 887).

Reduction in Relaxations of the Third Degree

One assistant immobilises the pelvis. A second assistant takes the affected limb; with one hand he supports the foot, with the other he grasps the knee, or better, the **middle of the thigh**.

Because, when wishing to turn the knee round in the course of the manœuvres of correction, he will run the risk of causing a fracture of the femur above the condyle.

You yourself embrace with both hands (fig. 887) the **upper**

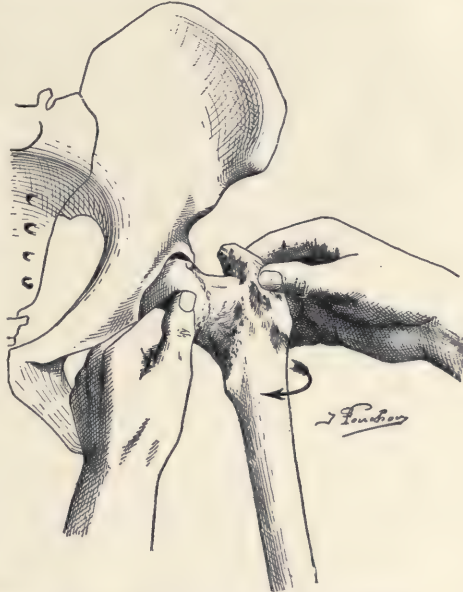


Fig. 888.—Correction of anterior relaxation. How one acts upon the upper epiphysis; on one hand, one draws the trochanter forwards, on the other hand, one acts upon the head to force it backwards into the cavity. In a general way, the head does not re-enter in this way during extension of the thigh, but in flexion.

¹ If fracture occur, you will stop immediately; plaster, and repeat the correction three or four months later.

third of the thigh and, alone or with another assistant supporting your hands, you commence slight movements of **internal rotation**, of only a few degrees, to-and-fro in a somewhat rhythmic fashion. At the beginning, for a period



Fig. 889.—Hyper-correction obtained in a left anterior relaxation. The trochanter, which was posterior, is moved forwards (on to a plane anterior to that of the head). But it is very rarely that one is able to reduce it thus in extension solely, by internal rotation. A hyper-correction too exaggerated may, strictly speaking, show a relaxation which would be made this time backwards.

of 5, 10, 15 minutes, and even longer in rather old cases, you feel an invincible resistance, and you appear to make no headway. Do not be impatient, do not be discouraged, do not go too quickly nor too roughly, you might fracture the femur. After 5, 10, 15 minutes you will finish at a given moment (a little sooner, a little later, but always) by feeling, or even seeing, that it “gives” a little, that it has already yielded a few degrees. A few degrees! How far that is from the end, seeing that one has to do nothing less than travel through 90° before arriving at the acetabulum, when the head is anterior; and through double that, nearly 180° , in the extreme cases, where the head is looking directly outwards.

However, the greatest difficulty is overcome. From the moment you have elicited movement, you will gain ground rapidly.

This means that in **half or three-quarters of an hour** (I have sometimes been obliged to go to an hour and a quarter) you will be able to accomplish the internal rotation necessary to carry the head opposite the acetabulum, but still a little above it.

You see then clearly, that in order to reduce into the cavity the head which is found **above it**, you must of sheer necessity carry it downwards, which you would be able to do only with great difficulty if you left the thigh in extension, but which you will be able to do easily by flexion.

Therefore, having carried the thigh into the very strong internal rotation necessary, you will **flex it** up to nearly 90° (see fig. 890), until you succeed, by the combination of internal rotation and flexion, in making the head enter the acetabulum.

It does not enter by the posterior margin, as in the first reduction, but by the superior margin.

This last-mentioned margin is the least marked ; consequently,



Fig. 890.—Correction of anterior relaxation. Position generally given in the first plaster (after correction). Flexion, abduction, internal rotation.

the jerk produced by the re-entry of the head into its former resting-place is not always appreciable. It produces, however, nearly always, a slight snap ; but if that is absent, your thumbs will always perceive, with a small amount of attention, a sensation as of a piano key when it is pushed down under the pressure of the finger and then released.

To sum up, reduction is effected in **forced internal rotation, associated with a notable flexion** of the thigh (adding to that the energetic pressure of two thumbs pushing from before backwards on the head of the femur) (fig. 888). One presses, flexes, and rotates inwards until the head has disappeared in great part into the depth of the tissues, or until it has reached

a point where it is felt a little backwards, against the posterior margin of the acetabulum.

However, the head should not make a too distinct projection at this last point, because one might go beyond the objective and bring about, in the long run, a posterior relaxation, through being too anxious to destroy the existing anterior luxation.

We may say, as a rule, that the head ought not to overlap more than a few millimetres behind (fig. 889).

After having given to the head the position we have said, one makes **abduction**; an abduction as great as possible, without the head ceasing to be in contact with the acetabulum.

But, in order that the contact continues, one must not generally push the abduction to more than 30° , 40° or 50° .

In short, the femur will be fixed, in the generality of cases, in a position of **flexion** (fig. 890) of about 60° to 80° ; in an extraordinary **internal rotation** of more than 100° (fig. 891), if the head were originally "external"; this rotation attains

sometimes **nearly 180° for the heel**, which actually looks forwards, and finally in an **abduction of about 45°** .



Fig. 891.—Anterior relaxation: for correction, one is often obliged to make internal rotation of the knee of more than 90 degrees.

Fixation in a plaster is kept up for two months—after which one verifies the position. One preserves the internal rotation, but one diminishes the flexion by two-thirds or three-

fourths, provided that the head (in spite of this diminution) remains in the acetabulum, which one would know by palpation of the hip, that is, one preserves the minimum flexion compatible with its retention, and one applies a second plaster to maintain this deflected position (more or less). The new

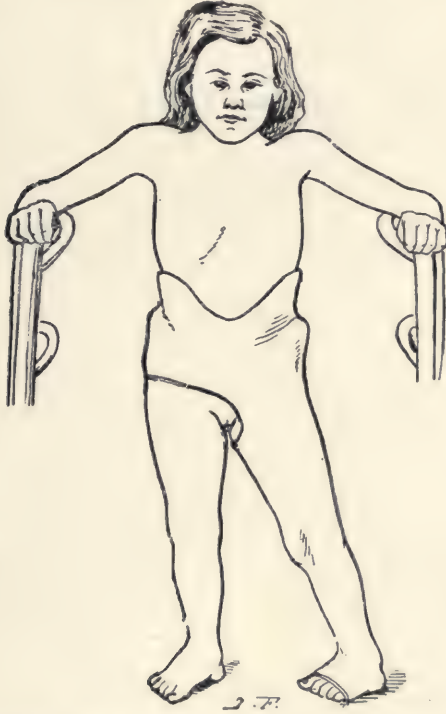


Fig. 892.—2nd position and 2nd plaster. The flexion in the first position (fig. 662) has disappeared here, and one maintains the new position for 3 months longer.

plaster will remain in place like the first, for about two months (fig. 892).

At the end of that time (six months in all), one allows the child to walk without the apparatus. At night, one keeps it still in internal rotation by means of ordinary soft bandages (see p. 761 and following pages).

The thigh, after removal of the plaster, returns gradually to its normal position; it does so, however, without the head leaving the acetabulum, which is a fact observed many and many a time by us, but which is not comprehensible save by admitting that the angle of the neck and the anteversion have been modified under the influence of the new position of the thigh and of new mechanical and static influences undergone by the femur since its second reduction.



Fig. 893.—A. D., 5 years; right luxation. Before any treatment.

Let me say that you need not be too concerned *à priori* at the torsion of the femur; it untwists itself, it alters its direction, it turns in the direction desired, in the most favourable direction for standing and walking, when one has secured a good reduction of the head into the acetabulum—just as the displacement of the femur increased, by the sole fact of the relaxation of the head.

One moderates or even assists, by preserving the reduction at night, the spontaneous return of the thigh to its normal position,



Fig. 894.—The same child, who had already been treated for eight months by another surgeon. Anterior relaxation of the third degree.



Fig. 895.—The same child. Relaxation corrected with manoeuvres of internal rotation of more than 90 degrees, with 50 degrees of flexion and abduction of 40 degrees.

according as the head appears to have already sufficiently made a place for itself in the acetabulum or not; generally, the limb finishes, after about ten months, by finding its normal position again, without the head having abandoned the acetabulum.

Sometimes, however, the head leaves the acetabulum slightly, but not sufficiently to cause a defect in walking. Instead of an anterior luxation of the third degree we have only a relaxation of the first degree, which, as we have seen on p. 796, is compatible with quite correct walking.

Sometimes a slight **genu valgum** persists. One treats it by the ordinary measures indicated on p. 609 for the treatment of genu valgum.

And, finally, after a year and a half or two years, one arrives thus¹ (see fig. 893, 894, 895) at the entire or almost entire disappearance of the lameness left by the first defective treatment.

POSTERIOR RELAXATION

Diagnosis

In default of the X-rays, one makes the diagnosis by the following signs: the gait is the same as before reduction, there

¹ There remain, however, cases where anteversion is so marked that direct interference is demanded; in these cases we have made, at the end of the treatment, when the child has already been in his second plaster for three months in internal rotation, an osteoclasis at the lower end of the femur, followed by the placing of the lower fragment of the femur and the whole of the leg in an external rotation of 50° or 60°, while the upper fragment is at first held firmly with the hands, in internal rotation, and then maintained there in a plaster. This is kept up for two months in order to allow of consolidation in the new position. This easy and harmless operation has given us the most satisfactory results; one obtains at one and the same time a good reduction of the head and a good position of the patella—with a very correct gait.

The bone fractures easily. There is no need to employ any great force, which means that one ought to obtain an external rotation of from 50° to 60°. In some very serious cases we have intentionally gone up to nearly 90°, which allowed us to obtain an excellent result afterwards.

What is the exact degree of external rotation it is necessary to give the lower fragment and the leg? The degree is equal to the angle of antetorsion of the upper extremity of the femur, which degree of antetorsion can be calculated clinically, or better still and more exactly by means of Radiography, by a method of my own demonstrated to l'Académie de Médecine, 4th June, 1918.

is shortening of the limb; as a general rule there is adduction and external rotation, a marked prominence of the great trochanter, which, moreover, is mounted up above Nelaton's line—probably the head will be felt in the buttock, and there is a sensation of a vacant space in front by the side of the femoral artery.

It is **always necessary to treat posterior relaxation**; it is always incompatible with normal walking.

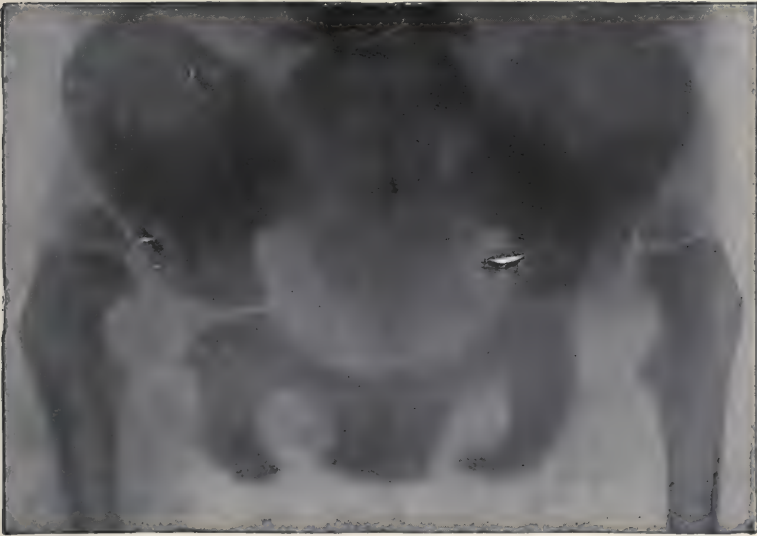


Fig. 896.—Double congenital luxation.

Treatment

This consists in making a new reduction—by manœuvres analogous to those performed at the first reduction. Note, however, some differences.

(a) Reduction is, this time, much more easy, and there is no necessity for anæsthesia, in ordinary cases, when the relaxation dates less than three months.

The pelvis being fixed by an assistant, you yourself take the

thigh and flex it to 90° , then you carry it outwards gradually, with both hands (or even with one hand only, the other being used in **forcing the head from below upwards**, in order to replace it in the acetabulum).

At a given moment you feel that the abduction gains a good deal, and that the knee sinks suddenly, the head has moved inwards and upwards; that is the re-entry.



Fig. 897.—The same, four months afterwards. The double luxation had been reduced, but the right hip is reluxated.

(b) One does not generally detect any snap at the moment of the reduction. As the relapse has been produced by the wearing away and obliteration of the posterior margin, one easily understands why one does not obtain a snap as the head passes the margin which is so very blunted; there is only a slight **dull sound**, a little **rubbing**, often scarcely perceptible.

Whether a snap is heard or not, one can always easily discover, by **palpation** of the groin, that the head has moved from behind forwards, and that the reduction is made.

(c) In order to repair the posterior margin, if much worn,

and in order to brace up the posterior capsule which is too loose, one keeps up the **abduction** this time not only at 70° , but **at 90°** (after a forced flexion of the thigh at 120° ; that is, the knee is raised up towards the axilla).

(d) The means of retention may be the same as that indicated on p. 778 for overcoming the tendency to relaxation (p. 856),



Fig. 898.—The same. The right relaxation remains reduced, but a posterior relaxation appeared three months later on the left side. The child again limps on the left side, and the radiogram shows that the head of the left femur has escaped from the acetabulum.

namely, some turns of Velpeau bandage, and fixation to the mattress.

You are able, then, to omit the plaster in order to maintain the correction, in the case where a return to plaster is objected to by the parents, but I do not advise you to agree to this in any but private patients, who have friends about them and are well looked after : in hospital, on the contrary, you will make use of a plaster, which is by far the simplest method.

After two and a half months you pass to the second position

for two or three months. The rest of the treatment is as given on p. 771.

The results obtained are perfect (see fig. 896 to 899).

Success is here more perfect and more easy to attain, as a general rule, than in **reluxation forwards**, especially in the **third degree**. So that, considering all things, an anterior reluxation is **much more troublesome than a distinct posterior relapse**.



Fig. 899.—The same. Reduction of the reluxation and its maintenance in a plaster (90 degrees of flexion, 90 degrees of abduction 0 degrees of rotation). Three months afterwards, a new plaster in the second position.

Radiogram taken one year after the correction of the reluxation. This time both sides remain well reduced.

IRREDUCIBLE CONGENITAL LUXATIONS

Limits of Reducibility.—Contra-indications to an attempt at reduction.

At what age is reduction impossible? That varies very

much **according to the case** (the degree of shortening in the anterior or posterior variety of luxation, fig. 900, 901, 902) and, perhaps far more, **according to the operator**. The reduction



Fig. 900.—Luxation of the anterior variety.

of simple congenital luxations has been possible up to 15 or 18 years, and even beyond that, by me and by several specialists. For you, who are not specialists, I think you ought to consider

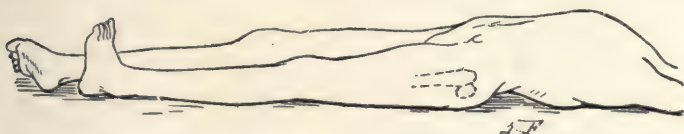


Fig. 901.—Luxation of the posterior variety with marked coxa vara.

the extreme limit as 6 or 7 years for unilateral luxations, and from $4\frac{1}{2}$ to 5 years for double luxations.

There are, then, age limits upwards for the treatment of luxa-



Fig. 902.—Intermediate luxation, directly supra-cotyloid.

tion, whilst *there are none in the opposite direction*; on my own account, I have performed reduction in infants of 8 to 10 months, and even of 3 to 5 months (the luxation having been possible of

detection before the patients had walked) and the cure has been perfect.

The Course to be Followed in Irreducible Luxations

What is to be done in the case of a luxation which you have been unable to reduce—in spite of two attempts under chloroform made at an interval of a few weeks and persisting after continuous extension for several months?

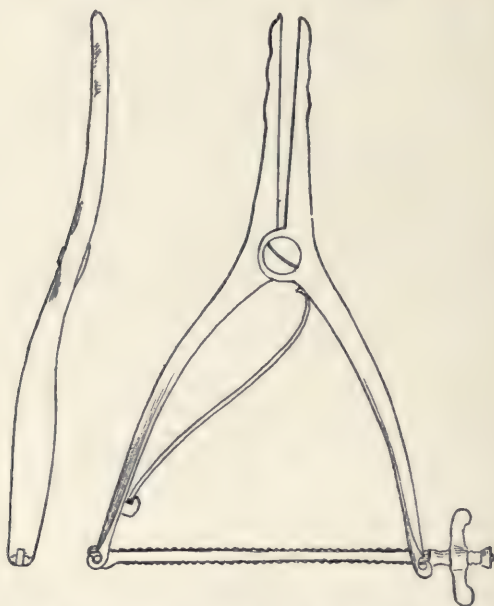


Fig. 903.—Dilating forceps which I have had made. They are extremely firm (with a force of 100 kilog.) and afford an enormous dilation, greater, indeed, than is necessary.

In such a case, I advise you, as a general rule, to do nothing, if there is no **palliative** treatment for the embarrassing symptoms produced by the luxation (see p. 824).

But that is not to say that an experienced specialist may not succeed in reducing these obstinate luxations.

One may succeed, in fact, by means of **surgical operation**. There are *three operations* which may effect the reduction.

1st. **Hoffa's Operation** : one clears out with a curette at the site of the rudimentary acetabulum, a cavity capable of receiving the head of the femur.

But : (a) The operation is *severe* ; it exposes one to septic accidents.

(b) It causes lesions of the Y ligament and, consequently, *troubles of development* in the iliac bone.

(c) It brings about *ankyloses*, as a consequence of the damage done to the bone and the soft parts, which are largely torn.

2nd. **Senger's Operation**, which needs an extensive arthrotomy, but does not clear out a cavity in the bone, and merely replaces the head of the femur against the rudimentary acetabulum.

But : (a) This operation, although less formidable than that of Hoffa, is *just as serious*, nevertheless, for the same reasons.

(b) It gives *reductions* which are *very unstable*, because the capsular canal being torn open the head no longer lies against the acetabulum.

(c) The extensive tearing of the capsule and of the soft tissues leaves hard cicatrices and fibrous *ankyloses*.

For these various reasons both the operations are practically abandoned.

3rd. **My operation**, or *reduction after Subcutaneous Stretching of the capsule of the femur*.

This operation escapes the objections to which the preceding two operations are open.

(a) It is by no means so serious, the cutaneous incision measuring scarcely two or three centimetres, and there is no need to insert the finger into the wound (therefore no risk of septic infection).

(b) The anterior capsule, which is very valuable for facilitating the reduction and *ensuring its maintenance*, is preserved.

(c) There are *no more hard cicatrices* than in a subcutaneous

tenotomy or osteotomy; therefore the *functional results* will be, obviously, *as good* as by the orthopædic method.

To establish its propriety, we say, first, that when irreducibility exists, in spite of continuous extension made for many months and forced extemporary extension, it is due to an insuperable **constriction** of the **capsular canal**. It will be sufficient, then, to perform subcutaneous dilatation of the canal.



Fig. 904.—1st step. The incision is made; the points of the dilator are introduced into the capsule; one makes them slide on the blade of the bistoury left in position to serve as a guide (hyper-extension and external rotation of the thigh).

We use, for that, a **special dilator** of extremely strong construction, made for this purpose (fig. 903 to 907).

Operation

1st. A cutaneous incision (from 2 to 3 cm. in length) is made opposite the anterior part of the head, which is *easily palpable* (if the thigh is in hyper-extension) at the outer extremity of the capsular canal.

2nd. One opens this by a button-hole a centimetre and a half long.

3rd. One introduces the dilator from without inwards down to the bottom of the acetabulum ; one feels its blunt extremity beneath the artery (fig. 904).

4th. Then one opens the instrument to dilate the constricted capsule ; one does this gradually and methodically until one has obtained a dilatation proportionate to the volume of the head, which has previously been determined.



Fig. 905.—2nd step. The fingers of an assistant fix the tip of the dilator (through the soft tissues) during the dilatation of the capsular canal.

5th. The capsular dilatation being effected, one withdraws the instrument, places a dressing over the wound, and effects the reduction by the ordinary manœuvres already described (see p. 741).

And one carries out the **after treatment** just as in the orthopædic method.

We refer you, for details of the operation, to our large treatise on *Congenital Luxation* (Masson).



Fig. 906.—Congenital luxation irreducible by the ordinary manœuvres.



Fig. 907.—The same, reduced by our operation (subcutaneous dilatation of the capsule of the femur).

We have performed this operation in twelve cases, in subjects of from eleven to eighteen years of age, and in all the cases, which had remained irreducible by orthopædic methods, we were able, after dilatation of the canal of the capsule, to obtain reduction of the head of the femur.

Indications for and contra-indications against our operation.—It is indicated in all unilateral luxations hitherto irreducible by the orthopædic method, because, in **unilateral luxations, reduction always has many more advantages than inconveniences.**

The possible inconvenience, in older children, is the remaining of a certain stiffness of the hip, such as one sees in the orthopædic method. For if the stiffness resulting from our operation is not appreciably greater than that left by the orthopædic reduction, it is evidently not less.

But, for unilateral luxations, the inconvenience of the relative stiffness (existing on one side only) is as nothing compared with the great advantages which reduction brings with it.

On the other hand, in cases of **bilateral luxations**, if considerable stiffness persists on both sides, the operation will not bring about sufficient amelioration, from the point of view of walking, to compensate for the tediousness of the long treatment.

But, in children of more than ten years, a noticeable stiffness will **generally persist** whatever the method employed, be it the orthopædic or our operation.

After ten or twelve years of age, the articulations are already slightly rusty.

We will conclude by saying :

For unilateral luxations, the contra-indication to any active treatment depends entirely upon the impossibility of reduction.

For double luxations the contra indication depends not only upon this impossibility, but also upon the age of the child. After ten or eleven years, in double luxations, there is not, unless

there are special indications,¹ any certain advantage to be gained from either a surgical or a non-surgical reduction, and one will then depend upon a palliative treatment.

These are the rules even for specialists.

PALLIATIVE TREATMENT OF IRREDUCIBLE LUXATIONS

If the parents are not willing to hear, at any price, of an attempt at a real reduction, it will be necessary for you to resign yourself to undertaking only a simple palliative treatment, in order to obtain some functional improvement.

Briefly, the function may be disturbed : 1st, by too great liberty and *excessive mobility* of the head of the femur (the head oscillating, moving to-and-fro extensively, with each step); 2nd, by *deviation of the knee* : (a) deviation *inwards* ; the knees knocking together at each step, if it be a double luxation ; (b) *flexion* of the knee, whence shortening, hollowing, etc., less good support of the femoral head which is carried, so much the more, backwards into the buttock.

To correct flexion and abduction one uses means gentle and slow, or even brusque and rapid, just as when one is correcting a club-foot or a coxitis.

The **choice** to be made amongst these different methods **depends rather on you**, according as you are able or not to attend to the child every day yourself.

It depends **on the friends**, who sometimes allow, and sometimes refuse you, an entire initiative and the free choice of the method to be adopted.

Many families agree only to mild measures ; therefore, no anæsthesia, no pain, no shocks, even if the result is to be so much the more distant and even more incomplete.

Well ! you know that you can succeed, by mild measures, in

¹ Thus, in some children of more than twelve years of age who presented **very great laxity**, almost abnormal, of **all the articulations**, we have reduced double luxations and obtained a very manifest improvement in walking as to endurance as well as to regularity.

arriving at a satisfactory result. You can correct or lessen a

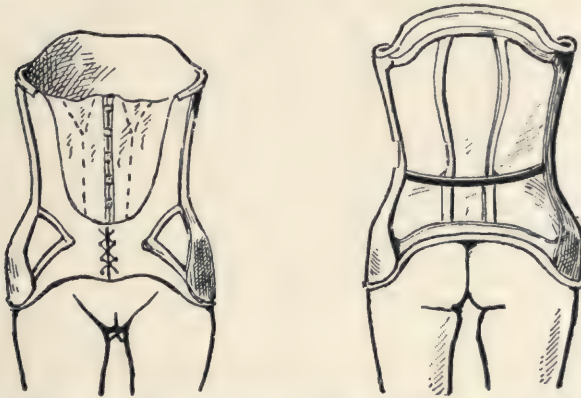


Fig. 908 and 909.—Corset designed by Breant to prevent swinging of the hips and to ensure steadiness of the femoral heads by pressure over the trochanters.

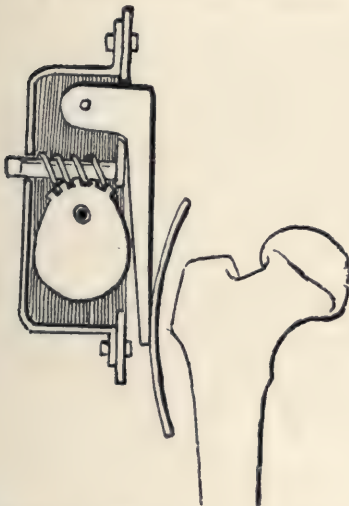


Fig. 910 and 911.—In this apparatus an excentric (regulated by a tangent screw) presses upon the trochanter.

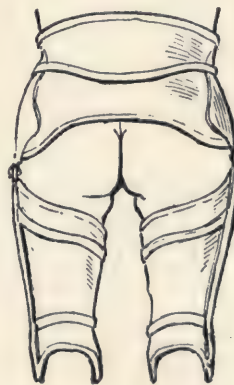


Fig. 912.—Double apparatus with this appliance.

deviation by a procedure analogous to that of the slow and gentle correction of a coxitis.

There are Three Methods of Improving the Situation

First Method.—Orthopædic Appliances

(a) *To lessen the vertical oscillation*, and the to-and-fro movement of the head of the femur, one invents a check, an artificial ceiling for the trochanter.

This is the rôle of corsets or girdles having a gusset with an inferior concavity moulded to the prominence of the trochanter, supporting and steadying it slightly in walking.

These orthopædic girdles, in celluloid or leather, of which the patterns are so numerous (every maker has his own), effectively lessen a little the lameness and fatigue in walking. Corsets and girdles are made on a **mould** taking the shape of the pelvis and the projection of the trochanter (see fig. 908 to 909).

(b) *If it is a question of lessening flexion and adduction*, one has had made a large apparatus similar to that in fig. 74, p. 83, an apparatus articulated at the hip, capable of affording each day a little more abduction and extension.

This first method is much less practicable and effective than would appear at first sight, the apparatus being either inadequate or too likely to be thrown out of order.

Second Method

Without an actual Operation or Anæsthesia. Successive plasters [in order to correct flexion and abduction] (see fig. 913 to 918).

The child does not discontinue walking. It is, in a way, a mixed method.

This is what it consists in : you make a correction of 15 or 20 minutes' duration every two or three weeks, proceeding gently and gradually, massaging, kneading, lengthening the tendons and muscles, as far as the limit tolerated by the child.

You carry the femur first of all outwards, then backwards, and, after a quarter of an hour or twenty minutes of

manipulation, when you have gained 10° or 15° for instance, you fix it there with a plaster apparatus reaching from the waist to the knee.

While the plaster is drying (before it sets definitely), try once

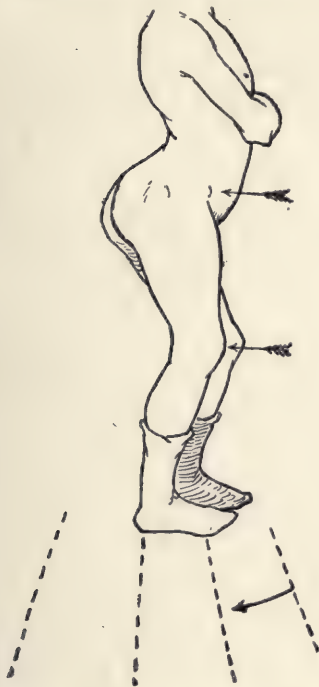


Fig. 913.—Double luxation. Lumbar concavity, flexion of the hips and flexion of the knees. The arrows indicate the direction of the correction to be made.



Fig. 914.—One sees here the abduction of the femur. The arrows indicate the direction to exert pressure and traction in order to obtain a relative correction.

more to gain 2, 3, 4, 10° . That will be enough for two or three weeks.

At the following sitting, the plaster being removed, you recommence, with the help of the same manipulations, the softening and stretching of the abductors and flexors, where you gain still more ; then a fresh plaster, and so on.

This is a method of proceeding which is generally very well received by the parents and by the children, and which will be practicable for you. If it has been well applied, it will always produce an appreciable improvement. One preserves this by an after-treatment of massage, and active and passive exercises.

Third Method

Immediate correction at one sitting, under chloroform. Then a plaster apparatus.



Fig. 915.—First step of the correction.



Fig. 916.—Second step.

In reality, you know that, when you have *carte blanche*, you may arrive at once, not only at correction but at hyper-correction, by the help of anæsthesia, and by vigorous manœuvres on the shortened muscles. In short, you carry out the kneading of the abductors and flexors described on p. 737, a kneading which generally suffices, without having to resort to subcutaneous rupture or to tenotomy, except in very exceptional cases. You will then push abduction up to 50° or 60°, hyper-extension to 25° or 30°, and make a rotation in the opposite direction to that which is present, sometimes internal, sometimes external.

The hyper-correction is maintained by an apparatus reaching from the waist to below the knee (a medium plaster, fig. 917), with which the child will be able, if desired, either to rest, or walk, by wearing a high boot on the foot of the affected limb.

After two months, one puts on a second apparatus for the same length of time, during which the abduction and hyper-extension are diminished by half; then one applies a third



Fig. 917.—Third step.



Fig. 918.—On removing the plaster, one has abduction and hyper-extension. Allow the normal position to return gradually.

apparatus, this one removable, of celluloid or leather, in a position of slight correction: abduction of from 20° to 25° and hyper-extension of from 12° to 15° .

Then the child is freed of all apparatus: he is massaged two or three times a day, one attends to his education in walking, the movements of abduction and hyper-extension are continued, in order to leave always the adductors and flexors, formerly

contracted, now somewhat weakened, and thus prevent the return of the deviation.

By having recourse, at night, to **extension**, the leg being maintained in an abduction of 20° by using a **cushion** to raise the pelvis (see fig. 919), one preserves hyper-extension. After-

treatment consists of active and passive exercises, and education in walking.

To sum up, you see that you are able to arrive at a result by the orthopædic method, either by gentle and slow means, or by means which are more severe and rapid.

You will never have occasion to perform the **Osteotomy** supra or sub-trochanteric of Kirmisson, which is, in spite of everything, **less simple** than the treatment we have indicated, and **less effective** also, for Osteotomy leaves a distinct shortening of the femur, and adds to the shortening which already exists; it certainly does not guarantee against the progress of the deviation, unless one treats also the tendons and the muscles in the manner



Fig. 919.—Method of correcting the tendency to abduction.

mentioned above. But this direct action on the tissues is sufficient, without one needing to interfere with the bones.

You will never have occasion to perform the operation known as the pseudarthrosis of Hoffa (refreshing the head and the iliac bone opposite the head, without reduction). We dissuade you from this for similar reasons; it is a treatment of greater difficulty

and of less efficacy, from the point of view of lengthening of the limb and correction of the deviation, than the treatment we have recommended above.

Therefore, in the case of irreducible luxation where the parents do not desire you to, or rather, will only permit you to, improve a little the function and increase the endurance of the child in walking, and are opposed to a real reduction, have for your rule for correction of the existing deviation simply to deal with the adductors and flexors, carrying the head of the femur to the anterior part of the iliac fossa, in order to improve the support as much as possible.

Here is a treatment for which you can accept the responsibility, and which will give you a real improvement, if, at the same time that you correct the position, you attend to the education in walking and the strengthening of the muscular system, by every means possible: frequent massage, active exercises, baths, electrification, etc., are essential.

CHAPTER XV

CONGENITAL CLUB-FOOT

Diagnosis.—A congenital club-foot is easy to recognise. It is a defective position of the foot which is *permanent* and exists **from birth**.

It is important **to distinguish it from paralytic club-foot** : this is easy even in a child of 5, 10, 15 years :

(a) *By the History.*—The paralytic club-foot appears at 1, 2 or 3 years of age, after an attack of infantile paralysis (see p. 670), whilst congenital club-foot exists from birth, although it may not have been noticed, sometimes, until some weeks later.

(b) *By the Shape of the Foot.*—Club-foot is nearly always equinovarus. The other (the paralytic) takes all kinds of shapes (fig. 920).

(c) *By the Resistance of Congenital Club-foot to Correction.*—This is effected with great difficulty, even in small infants, the bones being already deformed ; the paralytic club-foot is corrected, on the contrary, with facility, the bones remaining unaffected for a very long time.

(d) *By Examination of the Entire Limb.*—The muscles are only slightly involved in congenital club-foot, whilst in the other, the muscles and tissues of the entire limb bear the trace of infantile paralysis.

The **ordinary form** of congenital club-foot, as we have said, is that of **equino-varus**.

Its degree varies, generally according to the age, and also according to the subject, for sometimes a club-foot of one year's standing will be as advanced in development and as severe as another club-foot of four years' standing :

Chosen age for treatment.

At what age ought one treat to such a case? **As soon as possible.** Not, however, from the day of birth, as would Sayre, whose whims you should know: "I concede to the doctor," he says, "the right to deliver the mother before attending to a club foot of the newly-born: but he should not leave the house before having applied an apparatus." No, not that; nevertheless, in private cases, in attentive families, one will attend to it on the third, fourth, or fifth week, that is when the infant is recognised as more viable.



Fig. 920.—Paralytic Club Foot.

TREATMENT OF CLUB-FOOT

Club-foot is always Curable.—I am obliged to say this for the sake of certain practitioners who are still in doubt.

If any club-foot has not been cured in spite of treatment, it is because the treatment has not been properly carried out.

Here, as in congenital luxation of the hip, the failure ought to be attributed not to the gravity of the malady, but to the practitioner, who has not carried out, or to the parents, who have not allowed to be done, that which was necessary for the cure.

And more than one way leads to success; there are three methods by which it is possible to succeed.



Fig. 921.—Double congenital club-foot.



Fig. 922.—The same. One year later
Complete cure.

1st. **Daily manipulations** (where one cures without chloroform, without bistoury, “without a scratch of the skin”) together with “mechanical appliances” or supportive “boots,” worn during the intervals of the sittings for manipulation.

2nd. **Surgical operation**, where one divides the contracted soft parts, and where one removes from the skeleton everything

which prevents the foot being placed in the correct position. One does not hesitate even to resect some portion of bone from the foot if it is necessary for the correction.

3rd. **Forcible correction**, a mixed method which does not involve operation on the bones, but only the use of anæsthesia, with, usually, division of the tendo Achillis.

One performs forcible correction of club-foot just as one



Fig. 923.

Congenital equino-varus of 23 years' standing treated by forcible correction in two sittings of three-quarters of an hour each.

Fig. 924.

The same a year later; viewed on the external surface.

would the orthopædic correction of a deviation of the hip or of the knee, when it is somewhat obstinate.

Do not conclude that each of the three treatments is applicable only to club-foot at a certain age, and only at a certain age; that, for example, manipulations are suitable exclusively for quite little children, and surgical operation for children of more than ten years of age.

No; whatever the age of the patient may be, the practitioner

has the choice of his treatment. Manipulations have sufficed for patients of ten and fifteen years, and even for adults. On the other hand, osseous resections have been made with success in many children not yet able to walk (Jalaguier).

So, forcible correction is, for many practitioners, the only treatment for club-foot from three months of age up to adult age inclusively.



Fig. 925.—Manœuvres of correction in young children. The foot rests in the hollow of the left hand, the thumb outside, the other fingers hooked round the internal tuberosity of the os calcis. The right hand grasps the fore part of the foot in flexion, imparting to it a twisting movement which lowers the internal border and raises the external border.

But understand well what I mean by this, that an expert specialist may be able to guarantee to arrive at a cure with any of the three methods; but as to you, who are not specialists, who wish for the most practical treatment, I consider that the **first and second methods** are certainly **neither practicable nor simple**.

The **first**, because it is **impossible** for a **practitioner** to see his patient two or three times, or even once, each day for

a period of six to twelve months, in order to fashion and manipulate the foot for a quarter of an hour each time, and to replace it exactly and precisely in its retention apparatus.

To depend upon the parents carrying out daily this necessary "shaping" treatment, and to show you the child regularly, which would enable you to control, to verify, to rectify, if need be, and to complete what has been done, is without doubt not **impossible** theoretically, but it is, in fact, generally so **except**, perhaps, in the case of **children of the upper classes**.

Here I advise you to carry out, **from the first days** after birth, massage, exercises to promote suppleness, and corrective movements, for seven or eight minutes, three times a day, followed each time by the application of my lever-boot (see fig. 926 to 929) in order to maintain the correction.

This treatment, well done and continued, will allow you to carry the foot, **after** a few weeks or **a few months**, into hyper-correction; you will then, to preserve this, apply a **small plaster** made in the way which we will describe further on, and which will remain in position for one or two months, after which you will replace it by a second, then by a third. When the foot has been **supported** in this way for **five or six months in hyper-correction**, the cure is, and remains, effected.

If hyper-correction has not been thus obtained, you will hold, in order to succeed, a sitting for forcible correction under



Fig. 926.—Our lever-boot. The stem is of soft malleable iron.

chloroform, but I would not advise you to have recourse to chloroform before the infant is eight or ten months old.

The second method is also not applicable by the generality of practitioners, who will hesitate to have recourse to a surgical operation which ought, to be effective, to damage the bones considerably. And, even if the practitioner



Fig. 927.—Application of the lever-boot. 1st step: the plate is adjusted to the sole of the foot, the stem on the outside; a few turns of bandage fixes firmly the fore foot, the heel overlapping on the inner side.



Fig. 928.—2nd step: when the fore foot is fixed, a cast of bandage serves to force the heel and place it over the plate (correction of the curvature of the internal border).

does not hesitate, there are the parents who will refuse their consent to an operation on the bones of the foot.

For all these reasons, **I would advise you** to have recourse, as I do myself, to the third method, that of **forcible correction**, generally at one sitting, or at two or three, with a month's interval between them, in exceptionally obstinate cases.

Correction at one sitting is performed **under chloroform**, and lasts from 15 to 50 minutes, according to the age of the subject and the difficulty of the case. It can be done without any machine, without any instrument, **simply with the hand**, without bistoury if you like, and, at any rate, by confining the use of the bistoury simply to subcutaneous division of the tendo Achillis, which is at once easy and harmless. It is a **very simple, very effective** treatment, and, thanks to it, **every practitioner**, without exception, may treat and cure the club-feet seen in ordinary practice, up to 12 or 15 years, and, strictly speaking, up to 18 or 20 years.

But success will depend upon the exact observation of the following capital recommendations :—

1st. To be sure of reaching all the factors of the deviation. It is necessary for you to attack them one by one, "**breaking them down**," as you proceed.

2nd. To effect not only the correction, but even **hyper-correction**. You must **obtain too much in order to keep enough**. In a general way, the correction is not carried far enough. Know that, therein lies the secret and the cause of the relapses observed by some practitioners ; they have not pushed their hyper-correction far enough.

3rd. One ought to apply a plaster which will support **exactly** and not produce any abrasion.

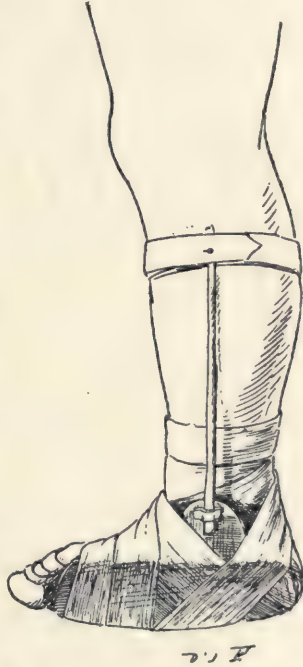


Fig. 929.—3rd step : One ends by fixing the foot over the plate, then bringing the stem to the leg ; by this movement the foot is carried entirely outwards, and its outer border is raised.

It is necessary to proceed with method, as we have said, by attacking all the factors of the deviation, to attack them one after another, and to obtain the correction by breaking them down.

A.—Technique of Forcible Correction

It may appear at first sight that, in equino-varus, the foot should simply be carried inwards and downwards, and that it suffices, consequently, in order to correct the deformity, to carry the point outwards and upwards.

Well, no, that does not suffice. The pathological anatomy and physiology of club-foot teaches us that the deviation is complex, that the point of the foot cannot be carried inwards¹ without it folding over the internal border, which thus becomes concave, and without, moreover, the internal border being raised, whilst the external border is lowered.

To sum up, one finds the following factors existing :—

1st. The fore part of the foot carried inwards in **adduction**.

2nd. The **internal border** of the foot changed into a **concavity looking upwards**, the extremities of which are the great toe and the internal part of the hinder extremity of the os calcis, whilst the external border is changed to a convexity with its apex corresponding obviously to the middle of the external border of



Fig. 930.—Inversion of the internal border.

¹ Similarly, in scoliosis, the vertebræ are unable to incline to one side without undergoing at the same time a twisting movement.

the foot, or to the external part of the medio-tarsal articulation.

3rd. An **equinism**, that is, the heel well above the point of the foot.

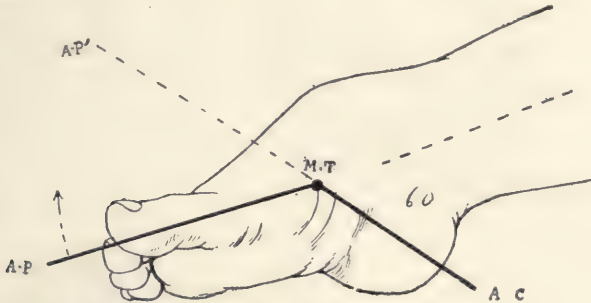


Fig. 931.—M.T. Medio-tarsal articulation.

M.T.-A.C. Axis of hind part of foot.

M.T.-A.P. Axis of the fore foot.

The arrow indicates the direction of the first step of the correction of equinism; by this manoeuvre the axis of the fore foot becomes M.T.-A.P'.

4th. A **hollow foot**, the sole making a broken line, with an upper angle opposite the medio-tarsal joint, without reckoning



Fig. 932.—In children, one grasps in this manner the foot and the leg; the left hand supports the foot, the right hand effects the movements of correction.

the inflexion of the two halves external and internal, of the sole, folded the one over the other in the same way as the two sides of a right angle.

5th. A **supination** of the foot, the external border lowered, the internal border raised.

This appears complicated; nevertheless, the existence of these different factors of the deviation is quite easy to understand, with a little reflection and a reference to a club-foot.

Well! to be quite sure of completely and definitely correcting a club-foot, you ought yourself methodically to attack these different factors in succession.

This is how one proceeds, the operation being carried out, of course, under chloroform.



Fig. 933.—Correction of adduction. Hold the leg with one hand, the foot with the other; both thumbs are placed below the external malleolus as the fulcrum; both hands pull in the direction indicated by the arrows. The rolling back of the inner border of the foot is also corrected by the same manoeuvre.

1st. **Adduction.**—The axis of the foot comes, by its anterior extremity, inside the axis of the leg. Bring it outside (fig. 933). This movement takes place a little in the tibio-tarsal, a little in the calcaneo-astragaloid joint, but especially in the medio-tarsal.

(a) Force back the foot *en masse* inwards and outwards at the medio-tarsal articulation, whilst the limb is firmly supported with two hands, very near the malleoli.

(b) Put the fore part of the foot in the same antero-posterior axis as the hind part by working on the medio-tarsal joint, and

by firmly supporting the hind part of the foot with one hand, whilst you operate with the other on the fore part.

(c) Push as far as possible the os calcis outside the astragalus.

2nd. **Unrolling the inner border of THE FOOT.** Make the concavity of the foot into a convexity, and inversely make the convexity into a concavity. Here, the movement takes place in the medio-tarsal and tarso-metatarsal joints.



Fig. 934.—Correction of the inversion of the inner border. The middle part of the external border rests upon the block; the surgeon applies pressure over the os calcis on the one hand, and over the internal border of the fore foot on the other, to undo the deformity.

If the child is quite small, we grasp the os calcis with the outer fingers of both hands on the one part, and the first metatarsal and great toe on the other part, to straighten, to make traction outwards upon the two extremities of the internal arch of the foot; and our two thumbs, joined outside upon the apex of the convexity of the external border, act by pressure in order to force back the apex of the arc inwards.

We do this again ten times, twenty times, thirty times. If

the resistance still continue, proceed as follows ; you will have to exercise greater force :

Place the convex border of the foot on a *round* block of wood with some soft covering (fig. 934).

The internal border of the foot presents its concavity upwards : apply the thenar eminences of your two hands over its two extremities, with all your weight, as if wishing to bring



Fig. 935.—Correction of supination. The four fingers of the right hand grasp the superior and internal surface of the foot and depress it, the palm of the left hand raises the external border at the same time.

them in contact with the table on each side of the wooden block, that is, the two extremities of the arch.

Do not be afraid of breaking the arch ; proceed, on the contrary, *as if you wished to break it* ; you will not succeed in that. Lean upon it with all your strength and, in children eight years of age and upwards, let an assistant place his hands upon yours. Press systematically, and as vigorously as you are able, for eight, ten or twelve minutes, until the foot

makes no more resistance, does not any longer return to its defective shape, no longer makes an arch on the inner side ; or at least until, with two fingers, one at the heel and the other at the great toe, you easily obliterate the concavity and maintain it in hyper-correction. This manœuvre not only unrolls the internal border of the foot, but acts usefully on the adduction of the fore part of the foot and somewhat on the concavity of the sole.

3rd. **THE inner border OF THE FOOT IS raised upwards AND ITS outer border depressed.** Depress one and raise the other. It is difficult, nevertheless essential. You will set to work by immobilising the limb firmly with the help of an assistant, and then grasp the two borders of the foot with both your hands, of which the thenar eminences and the thumbs will be under the sole, whilst the other fingers will embrace the two halves—internal and external—of the dorsal surface of the foot. You move the foot up and down, the hind part of the foot especially, by lowering the hand which holds the internal half

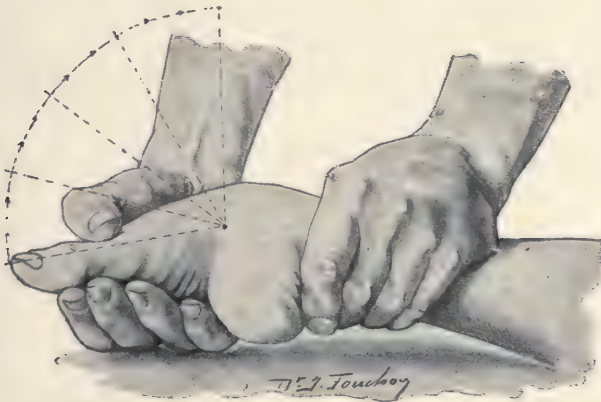


Fig. 936.—1st step in the treatment of equinism. The left hand grasps and immobilises the instep, the right hand moves the fore part of the foot up and down round the medio-tarsal articulation.

of the foot, and raising the other. You will persevere for some time, vigorously, methodically. A good manoeuvre is to endeavour with the inner hand to grasp the scaphoid and the internal part of the os calcis, and to make traction on the upper portion with all your strength, upwards and downwards, as if to tear the internal ligament which rivets them to the tibia.

You will soon feel the ligament stretch, creak, crack, break—which is a very good thing, because the ligament is the principal obstacle here.

4th. **THERE REMAIN equinism and hollow foot** (fig. 936

and 937). By raising the point of the foot, you endeavour to make the astragalus re-enter its natural position. It is necessary to widen the two divisions of the joint surface in order to effect this; this temporary separation causes no inconvenience.

But note, that in grasping only the fore part of the foot, you will deflect especially the medio-tarsal articulation, which is on the whole excellent, since you are going to **obliterate thus the**

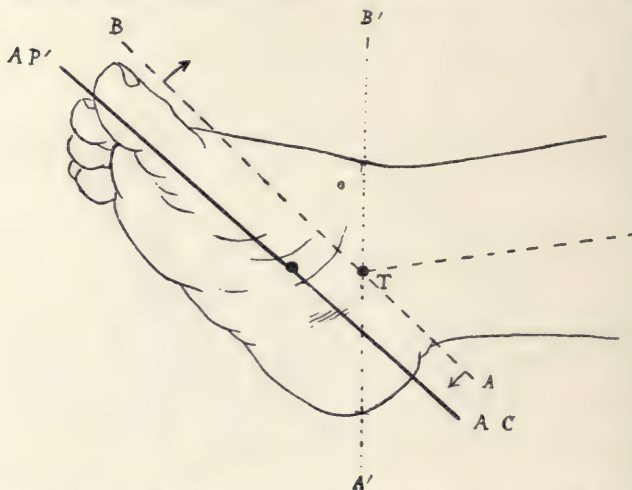


Fig. 937.—2nd step of the correction of equinism. T, axis of rotation of the tibio-tarsal joint after division of the tendo Achillis; the axis of the foot AB revolves round the point T, in order to take the position A'B'.

hollow foot and to transform the concave sole into a convexity, —without having to cut the plantar aponeurosis (the vigorous and repeated orthopædic manœuvres cause it to give way, without the help of the bistoury).

At the same time, if the movement is very vigorous, it affects a little the tibio-tarsal joint; **this does not suffice** to obliterate the equinism, even when it seems to do so.

Do not rely upon this appearance.

I will explain myself. It will often seem to you, when you

have raised the point of the foot upon the medio-tarsal joint, that the apex of the heel is sufficiently lowered.

This is not exactly so. The os calcis has not descended enough; it is the panniculus adiposus under the os calcis, very thick, which has produced the illusion.

In reality, the os calcis still remains very high, well above the point where it ought to be.

To bring it down, you grasp the bone very firmly and depress it by a prolonged effort, while the limb is firmly held by an assistant; you then seize with the curved fingers of one of your hands the posterior projection of the os calcis and draw it

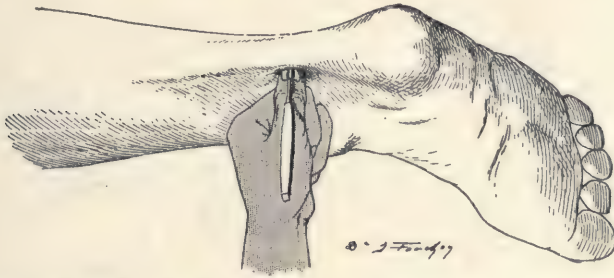


Fig. 938.—Division of the tendo Achillis: one pushes in the tenotome against the anterior surface of the tendon; the edge of the tenotome is then turned towards the tendon; one has no reason to be afraid of wounding the sheath containing the vessels and nerves.

down, whilst with the other hand, spread over the sole, you push the foot with an energetic movement from below upwards, endeavouring thus to make the astragalus re-enter its original seat and to move the bulky astragalo-calcanean joint backwards and forwards and up and down.

Repeat this manœuvre for three, four or five minutes, with great force, and you will nearly always succeed, in infants under one year of age, in obtaining sufficient depression, by stretching the tendo Achillis and the powerful fibrous ligaments which unite the os calcis to the bones of the leg. One feels them give way sometimes with a creaking, a special rumpling, identical with

that produced in subcutaneous rupture of the adductors of the thigh (see p. 446, fig. 447).

If the os calcis is not brought down—which will be the case in nearly all children over a year old, and occasionally in some below that age—have recourse without hesitation to the tenotome. Perform a complete subcutaneous section of the tendo Achillis, at 2 centimetres above its insertion (fig. 938 to 941).¹

The **section** is **much easier at the end** than at the beginning of the sitting.

Because, at the beginning, before the correction of the inversion of the internal border, the tendon is very near the posterior

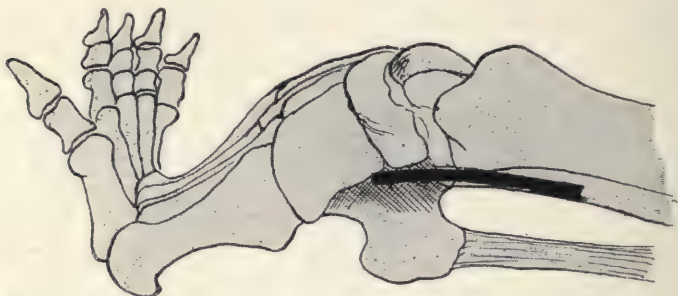


Fig. 939.—Pathological anatomy of club-foot. Schema showing the relations of the tendons to the vessels.

tibial vessels and nerves, it having followed the rotation of the calcanean tuberosity inwards and upwards (see fig. 940).

On the other hand, at the end of the correction, after the *straightening* of the internal border, the tuberosity is carried back (and the tendo Achillis with it) outwards, so far from the vessels that there is no risk of injuring them.

The section performed, you place a compress over the small wound in order to arrest bleeding. This small wound does not measure more than a few millimetres in length. It is not necessary to suture it.

¹ See also, for the technique of tenotomy, fig. 731 and 732, p. 678.

Nor is it necessary to divide the peroneo-calcanean ligamentous fibres.



Fig. 940.—In equino-varus, the os calcis is *turned about* in such a way that the posterior surface becomes the superior; its postero-superior border approaches the tibia, taking with it the tendo Achillis; the tenotome ought to seek for the tendon at the bottom of a depression sometimes very considerable (compare with this figure the following one which represents the normal foot). It will be necessary to cause the tenotome to work at its point by small cuts, repeated until the os calcis allows of its being depressed.

When the tendon has given way, the bone has always descended sufficiently to allow you to grasp it firmly with your fingers, and, by pulling it again downwards, you will succeed in rupturing the ligamentous fibres which are now isolated.

The operation is finished. You make some concerted movements of correction before passing on to the fixation.

If you have not been able to bring down sufficiently to your liking the internal border of the foot (especially the hinder part) you proceed to complete the depression now that the os calcis is well down. At the same



Fig. 941.—A normal foot.

time, the raising of the external half of the sole and abduction are then easily completed.

You will take the precaution of making sure that the hyper-

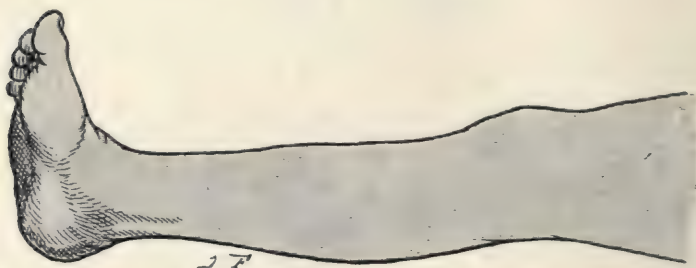


Fig. 942.—Correction with which one must not be content, in spite of its appearing to be sufficient. One ought to obtain a very free hyper-correction, such as that in fig. 944 and 946.

correction is maintained with two fingers, that is, without any effort.

You ought not to stop the manœuvres before having obtained the following result :—



Fig. 943.—After the manœuvres of correction, the foot ought to be found flexed at an angle of 45 degrees, its external border straightened in such a way that the sole is quite convex.

The foot in real **abduction**, the axis passing by about 45° or 50° outside the prolonged axis of the leg ;

The **internal border** of the foot **distinctly convex** ;

The **external border concave** ;

The **internal border** placed **lower** than the external ;

The **heel lower** than the point of the foot ;

It ought to be possible to flex the foot at a very acute angle upon the leg.

The **sole** of the foot **convex**, whereas it was formerly concave.

Opposite the medio-tarsal joint, on the under surface, instead of the concavity we had, we have now a convexity. On the upper surface, the prominence of the astragalus has disappeared.

Notice this important point ; I return to it intentionally, it is that **one must never commence** forcible correction by



Fig. 944.—The **minimum hyper-correction** which it is necessary to obtain.

the division of the tendo Achillis ; apart from the reason already given, you would deprive yourself of a precious fulcrum for the deflection of the fore part of the foot upon the hind part, that is, for transforming the hollow foot into a convex flat foot. It is always at the end of the sitting that you should divide the tendon.

By making no more, or almost no more, manœuvres on the foot at this stage, you will run no risk of infecting the small tenotomy wound.

You now cover up the wound with an aseptic dressing and a light wool compress, and you will then be able to pass on to the application of the plaster apparatus.

The correction has required from 15 to 20 minutes, in children

of from one to two years of age—but half an hour, three-quarters of an hour, and even longer, in patients of from five to fifteen years of age—in spite of you having operated with much spirit and vigour, and that you have been well assisted, which is necessary. You must have two or three strong assistants who are able to replace you for a moment, when you are fatigued. Thanks to them, the operation will be as short as possible; and you would scarcely be able, in fact, to prolong anæsthesia beyond from 20 to 25 minutes in children of from one to two years, and beyond three-quarters of an hour in the oldest.

It is necessary, then, that everything should be finished in

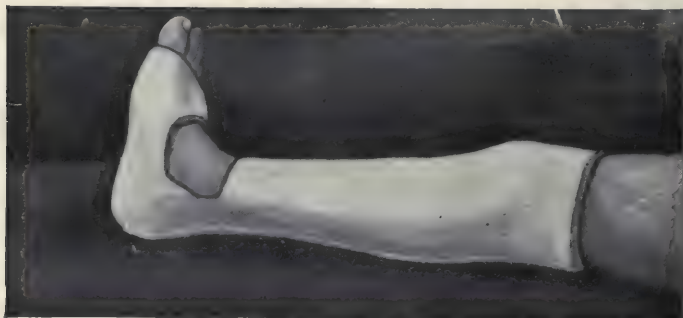


Fig. 945.—Insufficient apparatus; not enough flexion; more than that, the great toe is not sufficiently supported.

that space of time. If, exceptionally, the correction is at the moment insufficient, it would be better to stop there and complete the correction later, at a second sitting.

B.—Maintenance of the Correction. Construction of the Apparatus

The result obtained, one must preserve it permanently.

To do this, you will apply, from the toes to the mid-thigh, a plaster apparatus over a very thin layer of cotton wool, or, rather, over a stocking, or a sleeve of a jersey, well adjusted, without folds. You will make the application very carefully, with plastered bandages, exactly, without pressure, and avoiding folds and

creases, in front over the instep; to avoid these, you will cut into the bandage in several places, which facilitates the regularity of the application.

You also take great care not to pull too much upon the bandage on the foot, in order to straighten the turns; having finished the apparatus, you will not push nor press upon the plaster, to obtain an addition to the correction—because, that would produce, opposite the fold of the instep, a projection of plaster which might force its way through the skin. It remains obvious that one should most carefully support the sole of the foot to



Fig. 946.—Plaster apparatus well made; the great toe is well supported, flexion is at 45 degrees, the internal border of the foot is lower than the external; an opening has been made on the anterior surface of the instep to avoid too great pressure on the soft tissues.

the extent that is necessary to recover entirely the correction previously obtained.

To go beyond that would be to produce **sores** at the points of pressure, at the places where the fingers were applied, because the foot, being like a spring, would then have a tendency to press against the plaster. More than that, the position of the foot should be exactly the same from the first turn of the bandage to the setting of the plaster. You would thus avoid wounding the skin.

If, in spite of all these precautions, the plaster appears to have been badly applied, either because there exists, perhaps, a certain pressure at some point, or because you have been unable to avoid folding the bandage, for example, in front of the

instep, you make with the bistoury a small square opening opposite that point, closing it afterwards with squares of cotton wool held in position by a muslin bandage.

I have scarcely any need to describe what is necessary to be done in cases where the toes have become **blue**, or **anæmic**, or **insensitive** to a prick, because those things will scarcely ever happen if you follow the indications already given.

However, if such a condition is produced (one must always look ahead) **you will lay open the anterior surface** of the apparatus, beginning at the lower part, separating the borders for 1 or 2 cm., cutting higher and higher, until you see the circulation in the foot regulated—then you will raise the borders, slipping under each of them a thin layer of cotton wool,—and, lastly, you will fill up the anterior longitudinal gap with another strip of cotton wool and apply a soft bandage.

From the way I have dwelt upon these directions, it may seem to you that a sore is much to be feared. That is not so. I have given you this wealth of precautions in order to put you on your guard, even in very small children—not because a sore is exactly dangerous, but because it is a worry and a source of delay. If sores do occur,¹ it is necessary, very often, to remove the plaster and attend to their cure, which is sometimes slow, before replacing the plaster. One would not do this without first re-making the correction, which has meantime become partially lost.

C.—After-Treatment

After-care.—In small children, there is another precaution to be taken, of the greatest importance. It is to prevent the urine getting under the plaster and softening it.

To preserve the skin and the apparatus, you will recommend the parents to cover the plaster with some kind of impermeable linen, fitting closely round the knee. They should also keep the feet of the child elevated. It is because of this inconvenience, in small children, that the apparatus should stop short at the knee, whilst

¹ See p. 66, *how to recognise them and how to treat them.*

in older children it should reach above the knee, in order to slightly correct internal rotation of the limb.

However, if, in spite of everything, in younger children, the apparatus is softened, or if the urine penetrates and sets up an erythema of the skin, one will simply take off the apparatus for the time being. One dries the skin, dusts it with starch powder, and prepares a new plaster as soon as the skin has recovered.

The apparatus is taken off after three or four weeks, in the case of adolescents in whom the correction has not been completely obtained in the first instance. One then completes the correction and fixes it in a new plaster.

It is especially in cases where the correction has not been perfectly obtained at the first sitting that one is tempted, after the application of the last turn of bandage, to complete the correction by making energetic pressure through the plaster. It is especially then that one must resist the temptation.

But I have sufficiently insisted upon this point.

If the correction has been well secured, and if the **plaster** is well tolerated, **one leaves it on for two months**. If it is a case of a child who can walk, one allows him to **walk on the third or fourth day**, with a boot or a slipper intended to protect the plaster from damp, rough usage or unnecessary wear.

I say from the third or fourth day, because by that time all pain has disappeared from the foot and the plaster is quite firm. The weight of the body can only accentuate the correction, the shape, and the modelling of the foot.

At the end of two months, when you have removed the plaster, you will verify the correction, then apply a **second plaster for two or three months more**, in hospital at any rate,—then a **third** for the same length of time, after which the foot is set completely free. The **entire treatment** has taken from **8 to 10 months**.

In private practice, one may, before applying the second plaster, take a mould in order to have made a celluloid boot which will keep up the hyper-correction. This allows one, fifteen days

later, when the boot has been made, to do away with the movable plaster and see the foot every day, to ensure the return of its pliability as well as the treatment of the muscles by massage, electricity, and voluntary movements.

After each sitting, one replaces the celluloid boot, with which the child walks as he walked with the plaster. He keeps on the boot also during the night for the first six months, without which the correction might be lost.

With this treatment of the muscles and this conservative boot for seven or eight months, the foot remains well corrected. It is cured when the child can voluntarily carry the foot into the position of hyper-correction, and, consequently, can flex it at an acute angle.

In order to assure yourself of this, place him upright and tell him to stoop without raising the heel from the ground. The flexion of the leg and of the foot on this side of the right angle ought to measure at least from 30° to 40° . If the child cannot reach this, it is because there is a suspicion of a relapse.

The same applies if the elevation of the external border and abduction of the great toe are found to be insufficient,—which can only happen if one has not ensured enough hyper-correction or not persevered enough.

If such fault has been committed, it may not be irreparable ; but it should be dealt with without delay.

It is sufficient to make a **complement of correction** with or without chloroform, and to support the foot anew, duly corrected this time, in a plaster.

After six months in a celluloid, you order to be made for the child an ordinary boot with rigid supports, it should be one with one or two centimetres of elevation on the external border, a boot which he will wear for 1, 2, 3 years, during the day. With such a boot, the child ought to be able to walk as well as any one. At night, you will support the foot, slightly hyper-corrected, with my lever-boot, which the parents will easily learn to adjust.

There will remain only a certain amount of wasting of the calf, and sometimes, **on account of a twisting inwards of the tibia**, a tendency of the foot to be carried inwards, bodily (in spite of the evident complete correction of each of the factors of the club-foot).¹

If this tendency is only slightly pronounced, do not trouble about it; it will adjust itself alone, in the long run; if it is very marked, order a large celluloid apparatus, which will keep the foot in external rotation.

To sum up, the **after-treatment** is easy and the cure remains permanent if the **first hyper-correction** has been **pushed far enough**.

On the contrary, **if hyper-correction has not really been obtained**, the **consecutive treatment** by means of boots and massage will be "**diabolical**" for you, and when it is handed over to the parents, it will give, in that case, a bad result, and you will not avoid relapses.

Treatment of Club-Foot of Old Standing

It remains for me to say a word on the correction of old-standing club-feet of adolescents.

Are we going to have recourse to machines which bruise the foot in shaping it?

Or even to surgical operations, which take away one-half of the bones of the foot, if that appears necessary, in order to obtain complete correction?

¹ It should be noted, however, that in a very exceptional case one has been obliged sometimes to proceed too late *directly upon the tibia in order to untwist it*. The internal twist being the sole cause of this persistent bad position of the foot, one untwists the tibia either by an osteoclasis (either manually or with an osteoclast), or by a transverse subcutaneous osteotomy at the middle of the tibia (without interfering with the fibula) by means of the technique already described in Chap. XIII., in connection with rachitic deformities of the tibia. As soon as the bone gives way, one twists the lower half of the tibia and the foot forcibly outwards, and keeps it in that position for two months or two months and a half, in a plaster. After that the foot preserves a normal position.

Well, if you are a surgeon, let it be so! Resort to it; proceed after the manner of Championnière, who extirpates all the bones which get in his way, and deossifies the foot. And if you are in the habit of using the osteoclast, make use of that.

But that is not the way with most of you. Is it to be said, then, that you are to give up the treatment of these old club-feet? No; you will be able to achieve a result (which will stand comparison with those given by surgical operation and osteoclasis) by another method, which is quite within your scope. It is, simply, **forcible correction** with section of the tendo Achillis; it is, in fact, the correction we have just studied.

You will proceed in the same way, but it is especially here that it is indispensable for you to have at least 3 or 4 very strong assistants whose strength, added to your own, or taking your place when you want a few minutes "to take breath," will permit you to obtain the same effect as with a powerful machine for moulding, but with much more certainty. Then you are able to go as far as an hour of sustained efforts and anæsthesia.

If, in such a case, a very old one, you do not succeed at the first attempt, what then stops you, after a month or two, giving a second, a third **supplementary sitting** of correction under chloroform?—I advise you, however, not to push the correction at one sitting, when the operation is accompanied by much stretching of the skin, which might compromise its nutrition.

Finally, you will obtain a result which may not be so fine, without doubt, as the modelling of a foot at 2, 3 or 4 years, but which, from the point of view of functional utility, will be very good.

And you will obtain it by a method of which you need have no fear, which does not admit of, **if made at 2 or 3 sittings, any of the uncertainty of surgical operation and of the use of machines**, more or less brutal and uncertain.

The after treatment is then the same as that above.

CHAPTER XVI

THE TREATMENT OF TORTICOLLIS

I WISH to speak here only of **congenital torticollis**, or **true torticollis** (not of acquired or symptomatic torticollis). True torticollis is due to a contraction of the sterno-mastoid muscle, causing an inclination of the head on the same side (by contraction of the clavicular head) and a rotation of the chin to the opposite side (by the contraction of the sternal head, fig. 947). In the line of the muscle, one feels and sees a **hard projecting cord**.

There may be other contractions, the other muscles of the neck may be involved ; but it is exceedingly rare, at least, at the outset.

The contraction of the sterno-mastoid muscle exists from birth or begins in the early weeks after birth. It is **persistent** ; it is **painless**.

These are the characteristics which will enable us easily to distinguish true torticollis from torticollis due to rheumatism, acute and temporary, or from chronic acquired torticollis, which may appear at any age, and is generally symptomatic of cervical Pott's disease.

This last mistake has been made, and therefore it is really worthy of a little attention in order to avoid error. The history, pain on pressure over the spinous processes in the case of Pott's disease, puffiness in the region of the nucha, sensibility to all movement ; digital examination of the pharynx, or examination of the neck may suggest the possible existence of

an abscess ; these are most of the elements which are generally necessary in order to make the diagnosis.¹



Fig. 947.—Left torticollis. Rotation of the chin to the right, lateral inclination of the head to the left.

¹ When the hard and projecting cord in the situation of the muscle is wanting, it is not a question of true and essential torticollis, but an inclination of the head due to some other affection which you should search for by exploration of the region and by a general examination of the patient.

I.—AT WHAT AGE MUST TORTICOLLIS BE TREATED?

Instead of waiting for seven years, as some surgeons have decreed—I really do not know why—it is necessary to *deal with*



Fig. 948.—Up to six months or a year, correction of a left torticollis by simple manipulations. An assistant gives to the head a position opposite to that of the deviation (in the direction of the arrows); the surgeon pushes the shoulder downwards and kneads the muscle with his thumb (see fig. 952).

the condition as soon as possible, immediately the diagnosis is made.

First, and above all, because one avoids thus the appearance of secondary lesions, by no means negligible, which torticollis

brings in its train in the long run, in particular, atrophy of the corresponding half of the face and head, and a lateral deviation of the vertebral column.

Secondly, because at the onset, and up to three years, purely mild orthopædic measures of treatment suffice, without tenotomy.

Often, it is true, children are not shown to you until later, at four years, eight years, ten years of age.

II.—TECHNIQUE OF TREATMENT AT DIFFERENT AGES

A. Up to six months : *Correct by simple manipulations.*

Correction is obtained at this age easily, in two or three sittings, with manipulations and massage of the contracted muscle (fig. 948). One presses it, one kneads it, one stretches it without violence, but not, nevertheless, without a certain amount of effort. During these manoeuvres, one causes the two extremities of the muscle, that is to say, the head and the clavicle to be removed farther apart (this by traction on the shoulder) by any one at hand. The sitting lasts from four to five minutes. You arrive with this first sitting at a straight position, which you maintain in the way described farther on.

The next day or the day after that, a new sitting for manipulations which lead, at the second or third time, to a free hyper-correction, that is to say, to a torticollis on the opposite side (the ear of the sound side almost touching the corresponding shoulder, whilst the chin is turned round, on the contrary, towards the affected side).

Maintenance of the Correction.

Here is the most practical and the most simple form of bandage for preserving the hyper-correction. It may be constructed by all mothers, supervised and modified by them according to the needs of the case (fig. 949 to 951).

The head is fixed by a skull cap or an ordinary bonnet, with

a strap made of two ribbons tied under the chin. At the lower part of the bonnet one fixes with pins the upper extremity of



Fig. 949.—Bandage (face view) for maintaining the *correction* made of a left torticollis. The bandage which goes from behind forwards, by passing below the ear, maintains the rotation of the chin towards the left side (it was turned towards the right before correction); the second bandage which one sees inserted into the bonnet, above the ear, is intended to produce lateral inclination of the head to the right. One increases at will this lateral inclination and rotation of the chin. The bandage acts better than a plaster apparatus.

two bandages of linen or soft muslin, one behind the ear of the affected side, the other on a level with the ear of the sound side.

The two bandages pass in front of the axilla on the sound side and are pinned below to the child's knickers or to a girdle made with two or three turns of Velpeau bandage. On pulling upon the first of these bandages, one increases the rotation of the chin towards the affected side ; with the second, one increases the



Fig. 950.—The same bandage seen behind. One sees that, by adding a bandage here or there, one can easily give to the head the attitude one wishes.

inclination of the head upon the sound shoulder. The bandage is easy to take off and replace, which facilitates the child's toilet. I can promise you that in 6 or 8 weeks the cure will be obtained, if the bandage has been well applied and looked after.

It is obvious that, if necessary, in some exceptional case, one might prolong the use of it for several weeks more.

B. From 6 months to 3 years: *Correction under chloroform by rupture of the tendon with the thumbs.*

At this age, the treatment by manipulations may demand too much time and be too difficult to overcome the resistance of the tendon already over-contracted.

It is simpler, more expeditious, and more certain to rupture at one sitting the shortened tendon. There is no need of the bistoury for this; one accomplishes, at this age, the subcutaneous rupture of the tendon solely by the pressure of the thumbs through the intact integuments (fig. 952).

But it is necessary to have the help of chloroform. The child is put to sleep, you have the head grasped by one assistant, the shoulder by another. In the absence of experienced assistants, you may make use of improvised ones, whose movements you direct. Their duty is to pull on the head and the shoulder in opposite directions in order to stretch to the maximum the contracted tendon. When this appears to you effec-

tively done you attack it with your two thumbs (placed one against the other) on its inner border, at **one or two centimetres** above its lower attachment. You bear and press upon the cord more and more vigorously, with an approximate force of six or eight kilograms; you press by rhythmic jerks, until you feel the tendon give way and rupture, which is generally accompanied by a slight shock, at the same time that the skin is



Fig. 951.—The same seen in profile.

depressed under your fingers, and the assistants feel the resistance which had opposed the hyper-correction of the head, no longer present.



Fig. 952.—In children of less than three years, rupture of the tendon by pressure of the thumbs through the integuments—during which one or two assistants redress the head (in the direction shown by the arrows in fig. 948) and depress the shoulder on the affected side (see also fig. 447, p. 446).

This done, one stretches by kneading the neighbouring tissues of the neck and the vertebral column itself, because all the fibrous and ligamentous elements of the region are found to

have undergone contraction secondary to the shortening of the sterno-mastoid.

Preserving the *Hyper-correction*.

Put on a plaster? Yes, if you wish to, and if you know how. But I would warn you that a plaster fixing the hyper-correction at the degree desired, without discomfort or injury, is difficult to effect in children anaesthetised, whom one ought to keep in a sitting position for ten minutes at least, for the proper application of the apparatus. With these reservations, you may apply a plastered “minerva”; construct it in the way described on p. 320, for Pott’s disease, stopping the corset at the middle part of the thorax.

But I advise you to apply, in preference to a plaster, a simple soft bandage identical with that described above; *that is sufficient*. I have used it many times myself instead of a plaster and it has always given me entire satisfaction.

C. Above three years of age : Section of the muscle.

At this age, rupture of the tendon by pressure of the thumbs would require too great violence. Rather divide the muscle.¹

Should it be by the subcutaneous or by the open method?

If you are accustomed to the latter, if you prefer it under any circumstances, let it be so, keep to it.

But if you have no such preference, *I recommend subcutaneous tenotomy*, and this is why:

(a) I consider it useless, and even bad, especially in young girls, to leave a *cicatrix* of from 5 to 6 centimetres, which will always be visible and exceedingly unsightly. And one must give this extent to the incision, because a very large opening is necessary in order to see clearly into the deep tissues.

(b) As to the *harmlessness* of the operation, one is certain of always avoiding the great vessels of the neck, if one follows the technique of subcutaneous tenotomy which I shall give further on.

¹ You may perform it even below three years, if you have not been able to rupture the tendon by pressure of the thumbs.

You see, now, from the figure below, drawn from my own personal dissections (fig. 953), that the vessels are separated from the muscle by the thickness of the clavicle, the sterno-thyroid and sterno-hyoid muscles and their aponeuroses.

Is one quite certain of not causing a wound or inflammation of the vessels, when one uncovers widely the internal jugular

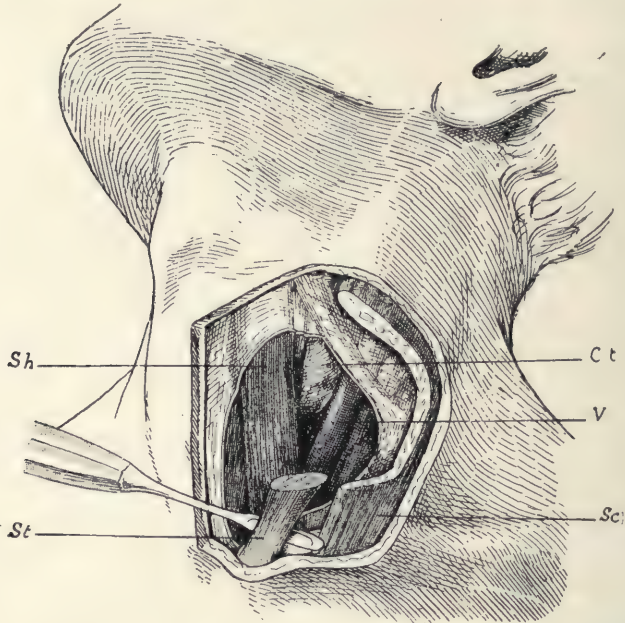


Fig. 953.—*St.* Sternal origin of the sterno-mastoid; *Sc.* Clavicular origin; *V.* (vessels). Carotid artery, and outside it the internal jugular vein; *Sh.* Sterno-hyoid; *Ct.* Thyroid body.

vein deep down in the tissues, as recommended by those who perform open tenotomy?

As to the *risk of infection*, it may be considered as of no account, with subcutaneous tenotomy. One is not able to say that, however, with regard to open tenotomy.

(c) But one of the great arguments, perhaps the greatest, advanced by those who prefer the open method, is that it is more *effective* than subcutaneous tenotomy, because in

subcutaneous tenotomy the tenotome is bound to spare some fibres of the contracted muscle.

Here is my reply :

Yes, it is true that the tenotome, in subcutaneous section, misses a few tendinous or muscular fibres ; but it misses them also in open tenotomy, not fibres of the sterno-mastoid, it is true, but always and necessarily some neighbouring aponeurotic and tendinous fibres, because, in rather old-standing torticollis, all the tissues adjoining the tendon of the sterno-mastoid, that is, the aponeurotic fibres and the other muscles, are also contracted, although to a less degree.

If our intervention is limited only to division of the sterno-mastoid, even if complete, we shall not have a perfect correction, any more than in club-foot, if we confine ourselves to section of the tendo Achillis alone. We ought, after the section, to knead all the tissues, stretch them, lengthen them, shape them ; and not only the soft tissues, but also the ligaments of the vertebræ and the bones ; we ought to shape the vertebral column, which is always slightly deviated in torticollis.

All one can say is, that we shall have less trouble with tendinous or muscular fibres in tenotomy by the open method than by the subcutaneous one.

But it is not more difficult to rupture the few fibres of the sterno-mastoid spared by the tenotome, than it is to combat the contraction of the other tissues of the region.

By the supplementary manœuvres which are directed against those fibres we will also cause them to give way in a very complete manner. Have we not caused the entire tendon to rupture in children scarcely younger ? (see page 865).

It is for the same reason that *I advise you to divide the sternal origin of the muscle only*, which renders the operation much easier, shorter, and more harmless.

And, it will *nearly always suffice*,¹ not because the clavicular

¹ St. Germain said he had never divided the clavicular origin, and it has only fallen to my lot to do so three times.

origin is not contracted—for it very often is—but because, immediately the division of the sternal origin is effected, we can nearly always easily accomplish the rupture, or a sufficient stretching, of the clavicular origin, by the simple manœuvres of correction which we are going to describe.



Fig. 954.—Invagination of the skin. The left index finger is pushed beneath the sternal origin, from within outwards, and makes a prominence by the side of the tendon, beneath the integument.

The Technique of Tenotomy

(a) Be supplied with a blunt tenotome as well as a pointed one.

(b) **The tendon is approached from within outwards, not at a finger's breadth, but at about 1 cm. above its origin, that is, as near as possible to the sternum.**

(c) Begin by dividing **the sternal origin only**, for the reason already given. The clavicular origin gives way afterwards, almost always, if one employs the orthopædic manœuvres

which have served to rupture the entire muscle in children of two or three years.

One divides the tendon **from behind forwards**. To do so from before backwards, as some advise, is infinitely less safe for those among you who are not surgeons.



Fig. 955.—The pointed tenotome is pushed along the dorsal surface of the left index finger.

First step: Place the head in position.—The patient is anæsthetised, so as to avoid any risk of voluntary or involuntary movements on the part of the child. The head in a slight extension of from 15° to 20° , is held by an assistant who will

move it when required. Another assistant stands ready to pull down the shoulder of the affected side.

Second step: Invagination of the skin beneath the tendon.—The muscle being relaxed by the assistant who holds the head, you will invaginate the skin with the left index finger, from within outwards, beneath the deep surface of the tendon up to the external border (note this well: **up to the external border**) of the sternal origin (fig. 954).

Third step: Skin incision.—With the pointed tenotomé, conducted flat upon the finger-nail behind the muscle, you puncture the skin in this hollow, to an extent of 4 or 5 mm.,

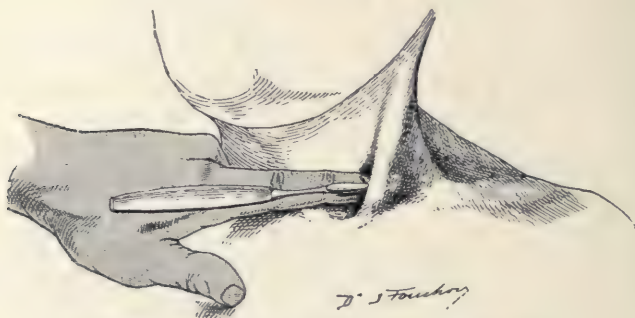


Fig. 956.—The tenotome is guided by the index finger.

then, without removing the index finger, you withdraw the tenotome and replace it by the blunt tenotome also introduced on the flat, the cutting edge upwards.

You then remove the index finger, and the invaginated skin returns to its normal place ensheathing completely the blunt tenotome.

You make sure that the blunt point corresponds still with the outer border of the sternal origin (fig. 955 and 956).

Fourth step: Division of the tendon.—Then, it is sufficient for you to turn the cutting edge forwards and to request the assistant who holds the head to give it a position which throws the muscle into tension, that is, to incline it towards

the sound side, and to turn the chin round forcibly towards the affected side.

Whilst this assistant, and he who is pulling down the shoulder, make more and more traction, the sternal origin cuts itself upon the cutting edge of the instrument, which you hold steadily.

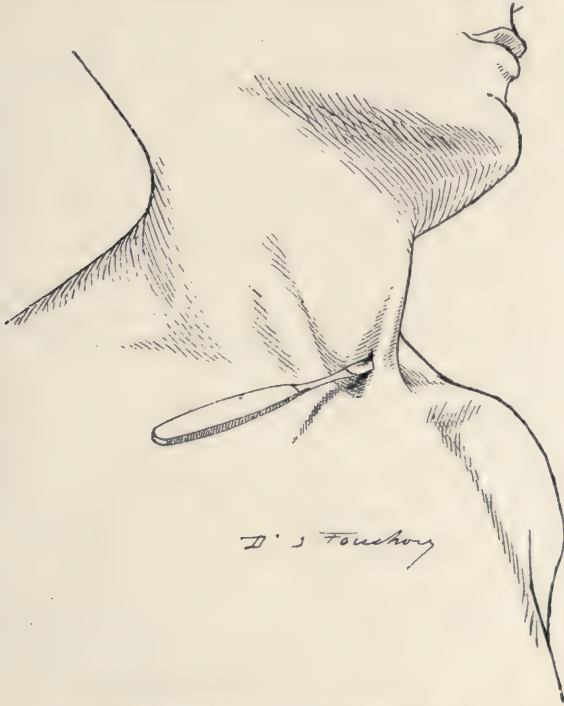


Fig. 957.—The tenotome is turned round, the cutting edge forwards; the muscle divides itself during the movement of straightening of the head operated upon by an assistant. (With the thumb and index finger, which have become free, one pinches and raises the skin forwards so that it may not be injured by the tenotome.)

Before the section was made, you had, with the thumb and index finger of the left hand, which was then at liberty, raised the skin forwards, so that it should not be wounded by the cutting edge (fig. 957).

All at once a **jerk**, a depression in the skin, at the same

time that one obtains a hyper-correction of the head, announce that the section is made ; you withdraw the instrument, and place a pad over the site of the puncture.

Fifth step : By manipulations, you set about the rupture and elongation of the clavicular origin, and the several fibres of the sternal origin, which may have escaped the bistoury.

You will accomplish this by manœuvres similar to those described above for children of less than three years of age (see fig. 948).

Sixth step : Shaping the neck.—At the same time and *by the same manœuvres*, all the contracted tissues of the neck are relaxed, and one models and shapes the vertebral column, always slightly deviated, as we have said. One inclines it in the opposite direction.

Prolong these manœuvres for 7 or 8 minutes, but proceed gently and without any violence ; violence is useless and may not be without danger.

But we return to the clavicular origin. If it has not given way, if it resist to the extent of preventing hyper-correction, which happens hardly once in twenty times, you will divide it after you have satisfied yourself as to this. In order to divide it, one follows a technique identical with that indicated for the sternal origin ; invagination of the skin, etc., with this difference, that one **attacks the clavicular origin** from the outer and not the inner side, as one does at the sternal origin, and that one approaches it at **two and a half centimetres above the clavicle** and not at one centimetre.

I conclude by indicating a variant of the technique, by which one dispenses with invagination of the skin. It is always possible, even in stout subjects, with a little skill, to invaginate the skin beneath the muscle ; rehearse this manœuvre the day preceding the operation, to make yourself familiar with it. If, however, you do not succeed in obtaining complete invagination of the skin beneath the muscle, then, to be quite safe, in spite of that, proceed in the following manner :—

Puncture the skin with the pointed tenotome **at the internal border of the sternal origin**, then replace it with the blunt tenotome, working with its blunt extremity ; it will go round the border little by little and pass behind the posterior surface of the muscle ; you will hold it parallel to that surface, or a little inclined forwards and outwards, the cutting edge upwards ; you advance until the blunt tenotome raises the skin at the external border of the sternal origin ; then turn it round with the cutting edge forwards, and you finish in the manner mentioned above.

Preserving the Correction after Tenotomy

When you have obtained a hyper-correction of such a degree that the sound ear almost touches the corresponding shoulder, you busy yourself with the means of maintaining this position.

For this purpose, you apply either a minerva plaster, if you know how to do it (but, I repeat it, the plaster is difficult to succeed with here), or better, a soft bandage identical with that already described above (see fig. 949 to 951). One preserves the hyper-correction for 15 or 20 days, after which the child is set at liberty.

After-Treatment

One massages, and tries to overcome any stiffness, making the patient take active exercises for stretching, such as carrying the head in all directions, and especially towards the sound shoulder, and you will supervise its return to the normal, which is made of its own accord, in ten days.

If the head appears to you to return rather too quickly, stop its progress by again applying a bandage either by night only, or by day also. You will keep watch in this way until the result is exactly what you wish, neither too much nor too little, neither on this side nor that of the necessary degree of correction.

To obtain this ideal, I can tell you that the bandage indicated (fig. 951) will be a help to you, more useful than all the exercises

in the world, because exercises are temporary, whilst the bandage can act night and day, if need be.

Conclusions

The simple technique which I have given you is that which unites all the advantages you could desire : **security, facility, and efficacy.**

If you follow it exactly, especially if you know how to use the simple bandage mentioned for the maintenance of the correction, I promise you that you will always succeed, and that the question will never arise, of its being necessary to extirpate the entire muscle, from the sternum to the mastoid process, as some surgeons have not feared to do, intending, as they say, to give a better chance of avoiding a relapse of torticollis !

CHAPTER XVII

LITTLE'S DISEASE (SPASTIC PARALYSIS)

LITTLE'S disease is an affection of the nerve centres, of congenital origin, characterised especially by contracture of the lower limbs—hence there is difficulty in or even impossibility of walking—and accompanied nearly always by a weakened intellect.

You know those cases well (see fig. 958 and 958*a*), those backward children of 3, 5, 8, 10 years, who do not walk yet, who do not know even how to stand on their feet, and who, when one tries to place them upright, touch the ground only with the points of their toes, while the knees and the hips are not able to be straightened. Watch them move their limbs; they throw them about spasmodically, knocking them together and crossing them.

Nearly always, they are brought to you solely for this inability to walk.

It is that which strikes and worries the parents. You, who are not blinded by parental affection, easily recognise that it is not only the locomotion which is backward, but also, and still more so, the brain and intelligence of the child. The embarrassment of the speech, the physiognomy more or less stupid or grimacing, the squinting or rather oblique way of looking, the inco-ordinate or choreiform movements, immediately inform you as regards this.

Let us return to an examination of the lower limbs. They are stiff as bars of steel, and agitated by slight, almost incessant, epileptoid jerks. The superficial reflexes are exaggerated. Babinski's sign is present.

In consequence of the ordinary localisation of the muscular contractures of the legs, the feet are usually deviated in pure equinism, or equino-varus—sometimes in valgus. The legs are twisted, the thighs are flexed and rotated inwards, but especially are they tightly held one to the other, so that it is extremely difficult for you to separate them.

If you fail in bringing the different segments of the lower limbs into a good attitude, you have to contend against a resistance almost invincible ("tetanic" or "cadaveric" rigidity of the joints) arising from spasmodic contracture of the muscles situated on the side "of the concavity of the deviations."



Fig. 958 and 958a.—Little's disease (of grave variety); expression stupid, thighs flexed, legs flexed on thighs, feet in equino-varus.

The spasm attacks especially the posterior muscles of the legs, the flexors of the knee-joint, and the adductors of the thigh.

On the other hand, the muscles "of the convexity" of the deviations may be partially paralysed. The name "spastic paralysis"

sometimes given to this malady recalls the two characteristics: enfeeblement of certain muscles, and contracture of their antagonists.

The malady attacks less often and less profoundly the muscles of the trunk or of the upper extremities.

There are marked alterations in the nutrition of the skin; the legs and feet are cold and blue, sometimes of an asphyxiated tint in certain very grave forms. The sphincters are unaffected, sensibility is intact.

Is there any need to say that this malady exists in every possible degree of severity, and that one observes it from the almost normal child who walks alone, but draws his feet heavily on the ground (as if they were held by heavy weights) and knocking his knees together, up to the completely helpless subject, whose legs are bent on his thighs and his heels drawn up to the buttocks? The same degrees exist in the mental weakness of the children, from a hardly appreciable stupidity to absolute idiocy.



Fig. 959.—Little's disease of medium gravity.

Let us add that nearly all are **born either prematurely**, at the seventh or eighth month, or in a state of **asphyxia** following a **difficult or prolonged confinement**. It has been remarked that it is nearly always the latter cases which are most wanting from the cerebral point of view.

Some authors are inclined to recognise in this malady an hereditary taint of syphilis, which appears to me to be far from constant; the presumption is, however, strong enough¹ to cause one to submit such children to specific treatment. We may say that this has proved nearly always inefficacious, even in cases where syphilis has been proved to exist in the parents.

¹ In two cases of Little's disease, M. Dejerine has found vascular lesions in the spinal cord analogous to those of syphilis.

The Course to Follow

What can you do for these children ? Is there really anything to be done ?

Well, yes, if it is not a case of complete idiocy.

How are you to recognise that contra-indication ? It is less easy than at first sight appears.

It is evident that you will not trust to the parents in what they always affirm to you, that the child is "remarkably intelligent," "simply nervous" or "absent minded." But remember to guard against the opposite error, which you might commit on the strength of your first impression, which would be nearly always disastrous ; you may take these children at first to be idiots, whilst, if you take pains to study them and observe them for some time, you will arrive at the conviction that their intelligence, at least three times out of four, is not absent, but that it is only retarded or dormant. You will find cases even where the intellect is normal, and this may be observed in children having an almost complete loss of power in the legs ; that is, the cerebral manifestations and the muscular manifestations have not necessarily developed to the same extent.

Note, that if the gravity of the intellectual troubles seem to establish, as they very often do (once in four times), a contra-indication to all orthopædic treatment, on the other hand, the degree, even when accentuated, of the muscular lesions, ought never to be a contra-indication of such treatment.

You will see on p. 887, from the explanation of fig. 962, what we have been able to do for a patient of fifteen years, with complete loss of power of the lower limbs, but whose intelligence was almost normal.

So that, if the child is not an idiot, you ought to submit him to orthopædic treatment, and you will arrive at half-cures, and, in some cases, at almost complete cures.

You will do this, provided you have faith, a sincere and living faith, that will make you follow these children, without respite and without impatience, for a year, or even, sometimes, two years.

THE TREATMENT OF LITTLE'S DISEASE

One ought to have a double objective and to concern oneself : 1st, with the brains of these children ; 2nd, with their legs.

1ST. PSYCHOLOGICAL TREATMENT

Commence a moral and psychic treatment against the retarded intellect. This part of the treatment will be confided to the mother; it is necessary to impress upon mothers that they must devote themselves to their children and not hand them over to the care of servants.

They alone can and will, by their infinite patience, which knows no discouragement, assist in the development of those backward brains and impart, by **teaching the patients to have a will** of their own, the discipline and the regulating rein of which they have need, in order to arrive at the command of their muscles.

They alone will not cease to repeat to their children, from morning till night, the same words, the same movements, the same exercises.

Tell the parents plainly that they must do this without suspense and without any fear of fatiguing the brain of the child.

Every gain obtained on the side of the brain will react happily on the function of the muscles attacked by contracture. The more the brain commands, the more will the reflex spasms be lessened, and the more will the patient be capable of educating his limbs with a view to his eventually walking.

2ND. ORTHOPÆDIC TREATMENT

The local and direct treatment of the deformities alone concern you: it is as necessary, in order to arrive at a good result, as the psychological treatment of which we have spoken.

A. The Chosen Age for Orthopædic Treatment.—You will commence as early as possible, that is, as soon as the intelligence will permit it. It is necessary that the child help himself in order that the treatment may be efficacious: it is necessary that he know a little of what is required of him, when one says, “Be careful”; “Hold yourself well”; “Straighten yourself,” and

he will learn how to make an effort, as little and of as short duration as may be.

There are some who will respond very early ; others, on the contrary, who will not react intelligently before 3, 4 or 5 years. You ought to wait for the **awakening of the will** of the child before commencing the local treatment.

B. Technique of the Local Treatment.—It consists in placing the different segments of the lower limbs in the position most favourable for walking, and in slight hyper-correction. Thus, the point of the foot which droops will be drawn to a right angle (or rather, to an acute angle) with the leg ; the flexed limb will be placed in extension (or rather, hyper-extension), so also the thigh now bent on the abdomen ; and in the same way, again, the thighs which were drawn closely the one to the other will be separated and kept separated.

1st. **Straightening of the Deformities.** This is effected, as in Infantile Paralysis (see p. 673), by orthopædic manœuvres with or without chloroform, with or without tenotomy.

(a) **Benign Form.**—If it is a slight matter, if the deviation is scarcely marked, the correction is made without the bistoury and without general anaesthesia.

(b) **Ordinary Form** (see fig. 958 and 959).—The deviation is sometimes very much accentuated (but it is only so in the lower limbs, the trunk and the upper limbs being exempt). It will be necessary for you here to have the assistance of tenotomy and chloroform.

In the foot, one divides the tendo Achillis, or, better, one elongates it by the subcutaneous route in the manner we have already indicated ¹ (p. 680). When it is only necessary to gain

¹ For little as the spasm may be marked, division, with or without lengthening of the tendon, is better than its forced extension by simple correction. To overcome the cramps, often very painful, it is necessary to use, besides tenotomy : (a) the psychological means already pointed out ; (b) massage and baths ; (c) all the well-known antispasmodics : bromides, valerian, etc. But success does not come at once—it takes time ; these spasmodic contractures hardly ever disappear before several months of treatment.

one, or one and a quarter centimetre (see fig. 733), simple tenotomy is sufficient. In other cases tendon elongation is necessary, because, after division, the fleshy portion of the muscle is so pulled upon from above by contraction, that the reunion of the two fragments cannot be effected, hence a very marked deviation in talus replacing the original equinism, but very little better.

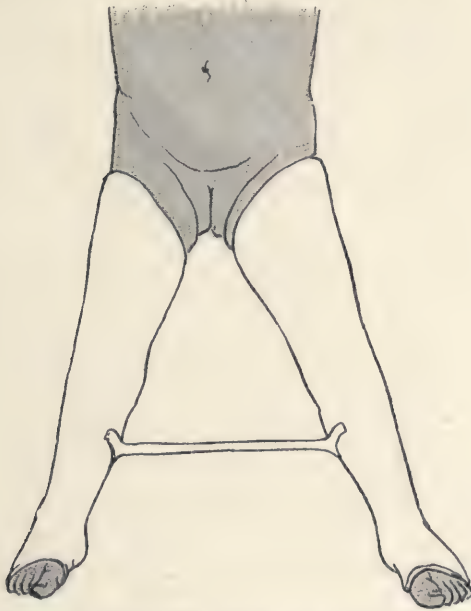


Fig. 960.—A stretcher intended to assure the abduction of the thighs. One is able to increase or diminish abduction by placing the stretcher higher up or lower down.

At the knee, one will divide the tendons in the popliteal space.

As to tenotomy in the popliteal space, follow the technique described on p. 685, which enables you to divide subcutaneously the biceps itself, without any fear for the sciatic and external popliteal nerves, which are situated at a centimetre and a half inside the tendon.

In the thigh, in order to divide the flexors or the adductors,

one operates in the manner described in Chap. II on Hip Disease (see p. 449).

2nd. Preserving the Correction.—The correction, or, rather, hyper-correction, of 20° to 25° of the feet, of the knees, and of the thighs, having been obtained by one of these procedures, whichever it may be (forcible correction, tenotomy or rupture of the tendons) it will be maintained for two or three months in a plaster apparatus¹ (fig. 960).

3rd. Placing the Child upon his Feet and Exercise in Walking.—Place him upright and try to make him walk with his apparatus a **few days after correction**, when he has recovered from the slight traumatism. **Do not wait**, do not leave him to rest for weeks or months, as is generally done; he would become still more incapacitated.

It is quite evident that it will not be easy to make him walk, even after all his deviations have been straightened.

At first he will not know at all how to keep upon his feet; it will be necessary to assist him, to support or rather to carry him almost entirely. The leg and the foot, maintained in the plaster, will necessarily remain in the position desired; but the patient will bend forwards at the hips, which have not been included in the plaster, as we have said.

One ought to induce him every moment to make an effort to raise the trunk, which falls forward. If you or his mother have

¹ In reality, in order to maintain abduction of the thighs, the plaster should include the pelvis, but the patient would thus be too confined and you would not be able to make him walk with the apparatus. Therefore the plaster, beginning at the base of the toes, ought to stop above opposite the trochanter. You will then leave the hips free for attempts at walking, and you will attend to the maintenance of abduction of the thighs only during the periods of repose of the child, that is, all night and in the daytime at the intervals of the exercises. To do this (see fig. 960), you separate the two plasters with sand-bags, or with a metal rod, having at its ends semicircular terminals embracing the two plasters and capable of being lengthened more and more, like a shoemaker's measure.

To prevent flexion of the pelvis on the thighs, it is necessary to keep the trunk flat with a few turns of Velpeau bandage passing round the frame upon which the child sleeps.

taught him to exercise his will, he strives to hold himself well, but he cannot do so alone, it is necessary to help him constantly, or nearly so, with one or two hands held out to him.

However, one will repeat these attempts from morning till night, without ever being tired or discouraged, with incessant repetitions: "hold on," "straighten yourself". . . .

These repeated efforts will not be lost. They will develop the will and strengthen, in the long run, the extensor muscles of the thigh on the pelvis, so that one day, after a few weeks or a few months of these attempts, which until then have been fruitless, the child becomes able to stand upright for a **few seconds**, without the help of his mother's hand, supported only by two crutches.

The progress is remarkable! To get so far that the child stands alone, without the help of any one, with only his sticks or his crutches, or walking-sticks—it is striking. It proves, not only that he has better muscles and more strength, but, chiefly and above all, that his brain has acquired the **sense of equilibrium**, which is the first step towards success.

Until then, so long as he needed the help of some one to keep him upright, the child had no sense of equilibrium and the success remained uncertain; now it is assured.

In reality, one may distinguish, in this laborious apprenticeship in walking, four phases, of which each lasts several weeks or several months, according to the gravity of the case.

First Phase.—After the straightening of the deviations, the child remains on his feet with the help of one or two persons, while *he is still without the sense of equilibrium*.

Second Phase.—*He knows how to stand on his feet without any personal assistance*, that is, with only the help of two sticks or two crutches; he therefore has the sense of equilibrium *whilst he is standing*, but he is not yet able to walk alone.

He is only able to walk with the help of one or two persons, for though he has the sense of equilibrium for standing upright, he has not yet acquired it for the more complex act of walking.

Third Phase.—He makes his first step quite alone, without assistance, with the sole support of his sticks or his crutches.



Fig. 961.—Child of ten years, after treatment. He had never walked. Actually, after a year's attention, he is able to walk with a walking-stick.

Fourth Phase.—After that, the battle is won. *He will succeed in walking* either without support or with a walking-stick only.

One, or even two years, are necessary to arrive at this result.

One word more on the apparatus for walking. One uses for two or three months, a plaster reaching from the toes to the trochanter, then a celluloid apparatus, articulated (with play limited by half) at the foot and at the knee. This celluloid is constructed on a mould taken by you. After having made the mould, you apply a new plaster worn for 15 or 20 days, which is the time taken to prepare a celluloid.

Having commenced the use of the celluloid, you take it off several times a day, either to give baths, or to carry out massage of the muscles "of the convexity."

To strengthen these enfeebled muscles, one has recourse to active exercises performed for a few minutes several times a day, either lying down or upright.

They consist in making



Fig. 962.—Bertha P., of Courbevoie, after treatment. She had come to the Orthopædic Institute at Berck at fifteen years of age (sent by my distinguished colleague and friend, Dr. Ardouin). She had never walked. Her legs were bent on the thighs and the heels glued to the buttocks, kept in that position by an apparently invincible contracture; legs blue, almost black, trophic troubles. The contracture extended to the muscles of the trunk, but intelligence was preserved, let us say three-quarters.

I had promised the parents to put the child on her feet and make her walk; but I demanded for this a year and a half to effect, and made the mother herself assist. In thirteen months the child (redressed in three sittings under chloroform) was on her feet and able to walk two or three hundred metres supported simply by a walking-stick.

the defaulting muscles work as much as possible, that is, causing them to raise the foot on the leg, to place the leg in extension on the thigh, the thigh in extension on the pelvis, and to carry both thighs into as great abduction as is possible.

After some weeks, one adds to this some passive movements, to bring back a supple condition to the joints, which are stiff, little or much, owing to the malady and to immobilisation in the apparatus.

The removable apparatus will be adhered to as long as the leg manifests a tendency to return to its bad position, that is, 6 months, 8 months, 12 months, this varying very much with the case.

Finally, one attends to the education, methodical and rhythmical, of walking. For still a long time, the child will drag the legs heavily ¹ and knock the knees together in walking; but this ends by disappearing more or less completely, thanks to massage, gymnastics, and repeated active exercises.

Exceptionally Grave Cases, where the Muscles of the Trunk are Included

The trunk weighs down the lower limbs of which the different segments are folded like an accordion. Even in these cases we are not disconcerted. We can succeed in making the child walk, with the help of two walking-sticks, it is true, by means of an apparatus reaching to the axillæ, an articulated apparatus with artificial muscles (see Chap. XIII.). But this is the business of the orthopædic mechanician; your part consists in correcting the multiple deviations existing, in taking a mould, and preserving the correction with a large plaster whilst the celluloid is being made.

Unless, everything considered, you do not wish to be troubled with these bad cases, happily exceptional, and pass them on to the specialists.

¹ He will advance on the points of the feet, walking **digitigrade**.

Conclusion.

In short, if the practitioner will and can undertake the almost daily attention these children require, if he is well seconded by the parents, he will accomplish little miracles.²

Again, the result depends upon the perseverance and faith of the practitioner, who knows or does not know, how to communicate his convictions and his perseverance to the parents. Some will know how to succeed in making such children walk sooner or later, others will never succeed.

There are numbers of children of 8, 10 (fig. 961), and even 15 years (fig. 962), who have never walked, and whose deviations, helplessness and troubles of nutrition are so grave that it did not appear justifiable to treat them—and who, after the daily attention we have given them for six months, a year or two years, have been able to walk hundreds of metres at a stretch, and without support, or simply with the support of a walking-stick.

The Surgical Treatment of Little's Disease

How many surgical operations have been proposed for the treatment of Little's disease? To tenotomy has been added the resection of a segment of a tendon several centimetres long, in order to prevent the return of a deformity. Partial resections of nerves supplying the contracted muscles have been made (Stoffel). Even worse than that, some have gone so far as to resect the posterior nerve roots, outside and even within the dura mater, operations called after Gulecke, van Gehuchten, and Förster.

But these operations, at least the last, the best known, are monstrous, and in the end their results (for the survivors) are not equal to, up to the present, nor manifestly superior to, those

² Improvement, little or great, is produced in all these cases under the influence of treatment well carried out. But I speak here only of the **true, congenital Little's disease**, and not of the **acquired spasmodic paralysis**, which begins at from 7 to 15 (Dejerine), and which, contrary to precedent, is **aggravated** year by year, whatever may be done.

obtained by simple tenotomy, or elongation of tendons followed by the patient education of the subjects.

For that reason I would dissuade you from these operations on the nervous system, which I do not wish to describe here.

Keep to the operations upon the tendons ; division or elonga-

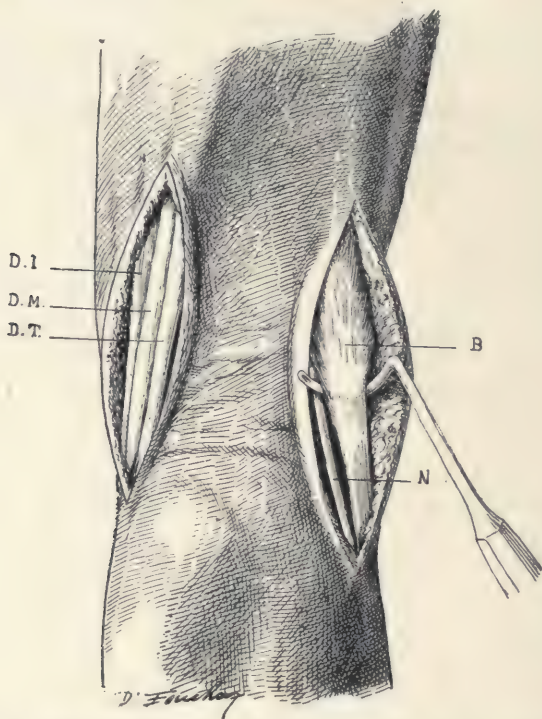


Fig. 963.—Tendectomy, 1st stage : The tendons are laid bare and isolated from the subjacent tissues with an aneurism needle ; the tendon is cut on the needle. B. Biceps ; N. External popliteal nerve ; D.T. Semi-tendinosus ; D.M. Semi-membranosus ; D.I. Gracilis.

tion ; at the most, add to those, at the knee, for very marked contraction, the resection of a portion of the tendons, shown here.

And if it is found that paralysis has extended to one or two muscles, remember that the transplantation or grafting of tendons may prove of service. In a word, in undertaking the

treatment of these cases, recall what we have said in the chapter on Infantile Paralysis.

But we must go into some details. And in the first place let us call to mind that one comprehends under the name of *Spasmodic Paralysis* certain clinical syndromes of various origins

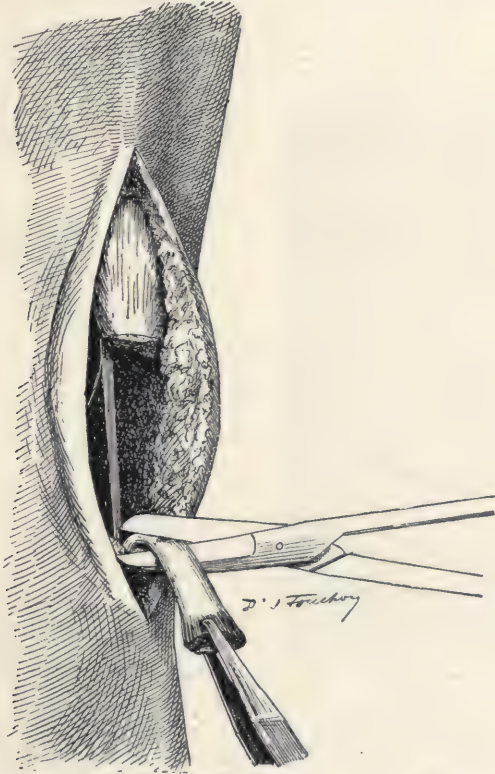


Fig. 964.—The peripheral end of the biceps is seized by the forceps and removed by a cut with the scissors.

which we will return to, especially those relating to Little's disease, hemiplegia or cerebral infantile paralysis. As indicated by their double name of **spasmodic paralyses**, they are a mixture, an association, of different degrees of cramps and paralyses (spasms of flexor muscles and ordinary paralysis of the antagonists). The **deformities** which result from these are **almost typical**:

there is often a club-foot complicated with **varus**, rarely with **valgus** ; there is **flexion of the knee**, with or without lateral deviations ; at the **hip** there are **flexion** and **adduction** generally complicated with internal rotation.

In the upper limb (in cerebral hemiplegia) there is contracture of the wrist, flexion and extreme adduction of the thumb, with flexion and pronation of the forearm.

As a rule, the spasms are exaggerated when the patients commence to walk. Finally, to the spasms are added some movements of athetosis.



Fig. 965.—Little's disease (of medium gravity) ; doltish expression, thigh in flexion and abduction, legs flexed on thighs, feet in equino-varus.

Indications for Operation.—Cases of spasms complicated with athetosis of the upper limbs and idiocy are, to all intents and purposes, beyond all our resources, but at the same time one must remember that idiocy is often more apparent than real. Outside these cases of extreme gravity we ought to treat, and be able to treat usefully, the deformities, the spasms, and the paralyses.

(a) *On the deformities* : at the *foot* by elongation or gathering of the tendo Achillis in the way shown on p. 681 ; at the *knee* by division of the hamstrings performed, as described at p. 651, and, finally, at the *hip* by division of the adductor

and flexor tendons (see p. 449). One can add, as we have said, the resection of 2 cm. of the tendon, as shown in the preceding figures (fig. 963 and 964), in order more certainly to prevent the likelihood of a recurrence.

Afterwards in some tenotomies, performed on both limbs, a plaster is applied of the pattern shown in fig. 960. This is removed at the end of six weeks, after which massage and gymnastics are commenced.

(b) *The spasms* are met by the same means, viz. division of tendons; but sometimes these re-unite, in which case recourse is had to transplantation of tendons,¹ which is more effective and certain than simple tenotomy.

(c) *Paralysis* of certain muscles, often combined with hyper-innervation of their antagonists: here one has recourse again to tendon transplantation which accomplishes a triple end; the weakening of the contracted muscles, strengthening of the paralysed muscles, and abolition of the spasms.

In the upper limb, the corresponding operations, being more complicated, remain in the domain of the orthopædic surgeons, who succeed in obtaining notable improvement with regard to the position of the fingers, the wrist and the forearm (supination).

Upon the whole, modern surgery has realised remarkable progress in the treatment of spasmodic paralysis, although that progress has been much less than in the treatment of infantile paralysis.



Fig. 966.—The same after surgical operation.

¹ See the Surgical Treatment of Infantile Paralysis.

FOURTH PART

CHAPTER XVIII

ON THE TREATMENT OF TUBERCULOUS GLANDS OF THE NECK

CASES of Cervical Adenitis are certainly less grave in themselves than by reason of the unsightly stigmata which they too often leave behind them, stigmata to which the world attaches such a disagreeable significance. "Any cicatrix on the neck hopelessly disparages a woman."¹

The aim of practitioners ought to be, consequently, to do all they can to avoid cicatrices.

Instead of that, how many surgeons are there still practising extirpation of these glands at the outset, which, when cured (?), inevitably leaves indelible scars behind ! For extirpation is far from curing always, and how many such recurrences do we see after operation ! (See fig. 967 to 972.)

It is against this operating upon adenitis that I set myself, admitting that it was my method at the commencement of my practice.

Is it possible to do better, and obtain a cure without leaving any traces ?—Yes, certainly, in this way :

(a) **Spontaneous resolution** is not uncommon. Therefore do not hasten to interfere.

(b) If a gland, instead of being absorbed, **softens**, you treat

¹ Berger. Surgical Congress, 1901, p. 723.

SUPPURATED CERVICAL ADENITIS.

(CONDITION ON ARRIVAL AT BERCK.)



This patient has been treated by the ordinary method of punctures and injections. The contained pus was yellowish-green, consequently oil, creosote and iodoform were injected. Eight punctures and seven injections were made, at the rate of about one every six days. After the eighth puncture (without injection) compression was made over the region of the abscess.

SUPPURATED CERVICAL ADENITIS.

CURE WITHOUT A CICATRIX.



The same patient as in Plate IV. This was the condition after two months' treatment by punctures and injections (see explanation of Plate IV.). It is evident that the cure is perfect and without any sign of a cicatrix.

[Between pages 894 and 895.]

CERVICAL ADENITIS.

MISCHIEF CAUSED BY SURGICAL OPERATION.



An example of the mutilation invariably left by the surgical treatment of cervical adenitis. The post-operation scar is seen to start from the mastoid process, following the anterior border of the sterno-mastoid, it passes below the hyoid bone and terminates on the other side of the neck. Below the ear the scar is depressed and whitish in appearance. Then comes a slightly prominent keloid. Lower down the scar is flat and violet coloured. Ineffaceable mutilation.

[To face page 895.]

CERVICAL ADENITIS.

CONDITION RESULTING FROM ABSENCE OF TREATMENT.



SUPPURATED CERVICAL ADENITIS.—In this case no treatment of any kind has been carried out. The patient had refused any interference, with the result that the gland lesion has invaded the integument, which eventually ulcerated at four points; through these orifices granulations are extruding.—Practical conclusion: abstention from all treatment is, here, no more permissible than surgical operation. In such cases the treatment by puncture and injection should always be had recourse to.

[To face page 895.]

it like a cold abscess in a limb, by punctures and injections ;
the cure will be equally perfect.



Dr. J. Touchon

Fig. 967.—Unsightly mutilations left by three surgical operations. Compare with this the complete cures which our method affords (see fig. 976 and 976a).

(c) If an indurated gland remains indefinitely stationary

(a more uncommon case), promote artificially either its resolution or its softening, but always by methods which safeguard the integrity of the skin.

Interfere by surgical operation only when the skin is already



Fig. 968.—Another example of the evils caused by surgical operation in the treatment of Tuberculous glands. This young girl was operated upon six times.

very widely ulcerated, and when there is, even from the æsthetic point of view, a manifest advantage in doing so, *which will scarcely ever be the case.*

This disposed of, we will enter into the details of the technique to follow in each particular case. One may distinguish three

varieties : 1st, suppurated adenitis, not opened ; 2nd, indurated adenitis ; 3rd, fistulous adenitis.



Fig. 969.—The same young girl as in the preceding figure.

TECHNIQUE OF THE LOCAL TREATMENT¹

1ST VARIETY.—THE ADENITIS IS SOFTENED, BUT NOT OPENED

This is the variety most easy to treat.

Take notice that most surgeons recommend operating upon

¹ See the thesis by Dr. Loze, of Berck, 1905.

indurated adenites for fear that they may become softened ; but that is precisely what should be desired.



Fig. 970.—Irregular cicatrices, resulting from the incision of softened tuberculous glands.

One finds oneself, then, in the presence of a cervical abscess. There is no more difficulty in curing it, by punctures and

modifying injections, than in any other region of the body (fig. 973).



Fig. 971.—Keloids resulting from simple opening and scraping tuberculous glands.

Why then does some surgeon, who treats tuberculous collections elsewhere by punctures, believe that he ought to have recourse here to the bistoury and to extirpation? One could

understand better his adopting an opposite course, seeing that the question of the visible cicatrix is of importance only in the region of the neck.



Fig. 972.—A proof that extirpation does not always cure; after an extirpation which has left a prominent cicatrix, a recurrence has been produced at two points, of which one has already opened spontaneously.

You will, then, treat softened adenites by punctures made with a needle, No. 3 or No. 4, and use the modifying injections. Choose the liquid which you know the best,

creosoted oil or camphorated naphthol with glycerine, follow the technique indicated in p. 123, and you will always arrive at, that is, leaving chance on one side, 99 times in 100, a perfect cure, without accident or cicatrix.

And still some members of the medical faculty can be found who say or write "that no serious advantage can be obtained from injections in such cases" (!) . . .

That is not to be wondered at. I myself used such language



Fig. 973.—1st variety: soft adenitis, suppurated; one punctures as one would for cold abscess.

twelve or fifteen years ago, when I did not know all the resources of the method of punctures, as I had not yet learned what use this weapon would be to me when delicately handled.

If the treatment proves too elaborate, do not exaggerate its difficulties—nine times out of ten you will not find any, and the cure will be invariably effected, without mishap: once in ten cases certain difficulties may arise, as in the treatment of a cold

abscess (see p. 142). I am going to refer briefly to them (fig. 974 and 975).

(a) If the skin is already a little altered in its coloration or its resistance when the patient comes before you, you will take precautions to save and strengthen it.



Fig. 974.—If the skin is already involved at some point, make the puncture some distance away, in the sound skin.

(b) If it is tension of the wall which constitutes the danger, you will empty the cavity by puncturing one or several times without injection. As soon as the skin has become stronger, you will commence the injections.

(c) If the danger consists in an invasion, already quite evident, of the deep surface of the skin by tuberculous vegetations, it is necessary to inject the cavity with a few drops of camphorated naphthol, to destroy those vegetations and detach them from the wall or to attenuate gradually their virulence ; but taking care



Fig. 975.—After puncture, one does not make an injection, but compresses the abscess by means of two strips of gauze placed crosswise.

to make frequent evacuations of the liquid produced by the “irritative” action of the naphthol, and thus reduce pressure upon the skin, which is already slightly tense.

I have had occasion to make, in these difficult cases, two or three punctures in the twenty-four hours, for several

days, in order to save the skin, thus effecting a cure without cicatrix¹ in patients whom very



Fig. 976.—Suppurated adenitis.
Condition on arrival at Berck.



Fig. 976a.—The same, after two months' treatment by our method.

¹ I refer here expressly to tuberculous adenitis and not to cold abscess in the cervical region, which ought to be opened. But, here again, try to prevent any trace being left. Instead, then, of opening with the bistoury, rely entirely for that upon our needle, No. 4, for punctures (see p. 114).

The pus flows by the small track, which will be reopened the next day with a blunt probe, or even with the same needle, No. 4. In a few days cure is accomplished, and nearly always without apparent cicatrix.

I have been observing a very fine example with my distinguished colleague Dr. Pescher, at Paris. We were able in this way to avoid a cicatrix in a young girl attacked by phlegmonous adenitis of the neck, which other surgeons had judged to be suitable only for a large incision, with drainage. Evacuating with the needle No. 4 led to a cure in 15 days, without any mark being visible.

It was in these collections, more or less clearly acute, that the ancient seton did good. But why do we not keep to one

able surgeons had declared curable only by a large extirpation.

It is especially in cases of this nature that practitioners will never agree on the course to follow ; as long, at least, as some understand and others will not, how to cure these "cases on the boundary line" by solely conservative methods.

Here are two observations very suggestive from this point of view.

First example : Some time ago, a professor of the Faculty of Paris sent me a child in this condition. He had said to the parents : Go at once to Berck, where they will perhaps cure your child without incision.

If you are not able to go immediately, come again to-morrow ; I will make an incision and perform curettage.

The child came the same day to Berck, and was cured in six weeks, without an incision and without a cicatrix.

Second example : I saw, in June, 1905, a tall and beautiful young lady of twenty-one years, Mlle. H., of Paris, with a suppurated adenitis as large as the fist, extending from the right ear to the hyoid bone.

She had already consulted three very able surgeons, who had been unanimous in recommending immediate extirpation, with dissection of the wall of this vast collection.

The mother having spoken to the surgeons of the treatment by puncture and injections, one of them declared that, in this particular case, it were folly to think of it, which was, moreover, easy for him to say who had never taken any part against the treatment and, indeed, very often employed it. "*Indeed*," he insisted, "*in the case of your daughter, it will do her no good*," and he added, "I am ready to affirm it in writing."

He wrote it, in fact.

only of the orifices made by the seton instead of making two ? On the other hand, in the tuberculous adenites, those of which I speak, do not trust to the seton, which will never produce a cure, any more than a simple incision is able, scarcely ever, to cure a cold abscess in any other part of the body ; remember, moreover, that the seton exposes the patient to infection from the tuberculous focus.

Let us add that there are **mixed, bacillo-septic** adenites, in which one is not always able to prevent a small cicatrix (I have said why in p. 156). At least, it is necessary always to fight against it.

And then the mother came to see me the next day, with this opinion signed by one of the greatest names in surgery in Paris.

I examined the young lady with the family doctor. The collection in the neck was enormous, was threatening to break through the skin, already raised at one point, in the shape of a little rounded eminence, and very thin.

I undertook, nevertheless, to set about the treatment by my usual method, promising a cure without leaving any trace. Two punctures, without injections, were made that day and the next. On the fifth day, I made a first injection of camphorated naphthol with glycerine. Altogether ten punctures or injections were made, at two or three days' intervals.

At the seventh week, the cure was complete, without a cicatrix.

These two observations will help you to remember that there is no suppurated cervical adenitis, however *voluminous* or *advanced*, which will not yield¹ to our ordinary treatment of punctures and injections, that is, be cured without cicatrix; and the great master who affirmed to the contrary, with so much "authority," did not know all that can be attained by puncture and injections.

2ND VARIETY.—WHERE THE GLANDS ARE INDURATED

Above all, do not, after the example of so many surgeons, hasten to extirpate. Why inflict at once on your patient, with a light heart, an unsightly cicatrix for life?

There is no other rational course here than one of the *two* following: either do nothing but *wait* for the resolution or the softening spontaneously; or else *promote* the softening.

¹ It is always advisable, under similar circumstances, to search in the mouth for a bad tooth, in which case the condition of the cure, certain and definite is the suppression of this source of infection.

A bad tooth, whether stopped or not, is capable of hindering the cure, or, at least, producing a recurrence.

How many times, *during a treatment by injections which did not succeed in the normal lapse of time*, have I not had stopped teeth taken out, which the dentist has assured me "could no longer be a cause of infection"!

"Take them out all the same," I replied, and the so-called "innocent tooth," being removed, I have seen the purulent collection dry up almost immediately.

First method : If the patient is not pressed for time, wait, and make him wait (fig. 977).

(a) Either adenitis will be **cured spontaneously**, and spontaneous resolution has been observed by most of us again and again, perhaps hastened by a general tonic treatment, sojourn by the sea, and also by local treatment. The last consists of



Fig. 977.—Small, hard adenitis the size of a nut. Expectant treatment, sojourn by the sea. One waited the spontaneous reabsorption.

an aseptic toilette carefully made, of the mouth and all the tributary tracts of the cervical glands—in the sacrifice of all bad teeth or those strongly suspected, in the eradication of adenoid vegetations, in the treatment of the ears, of the nose, or of the scalp, if the glandular infection comes from any of those different points.

(b) Or, the adenitis **will soften** of itself, which is also a

mode of cure without cicatrices, seeing that we return here to the first case, already considered. You will recommend your patient to await the time when this softening has occurred—he will recognise it by the tension and thinning of the skin and by its darker colour—and to come to see you imme-



Fig. 978.—Bulky adenitis suggestive of lymphadenoma, treated by X-rays and sojourn at Berck.

diately, before the skin becomes involved. If you have warned him, he will not fail to do so, because you have promised him that, by punctures and injections, you know how to cure him rapidly and without a blemish, “at the psychological moment when the spontaneous softening of his gland is produced.”

Second method: You have waited long enough—twelve months, fifteen months, twenty months—and you have come to the conclusion that the adenitis **will not yield at all**,¹

¹ But, you are going to ask me, is there not, then, any balneotherapeutic treatment at any station whatever, or any internal medicinal treatment, which would be able to resolve or soften the cervical glands?

I do not know of any. And yet I can state that I have tried everything, as well as all stations of repute and all internal treatment extolled in the books on medicine.

I do not say that all those treatments are absolutely without effect, I say only that they are uncertain, that there remain too many stubborn adenites, unwilling to soften or to be re-absorbed either by baths or the most reputed medicines, or by radiography, which, however, in a few cases has been able to hasten resorption or softening of the cervical adenitis.

Accessory Treatment by Radiotherapy

Note by my assistant, Dr. Fouchou.

What value has radiotherapy in the treatment of adenitis?

It has given certain results, but nothing precise or very constant. However, it may be said, in a general way, that, if the adenitis tends to reabsorb, radiotherapy appears to hasten the softening process and mature the abscess.

It is then an adjuvant for us in the action of the injections; we combine very often the two treatments. It is very difficult to give any precise rules for the employment of radiotherapy in the treatment of tuberculous adenitis. The apparatus for measurement are not yet very accurate (Roederer).

In any case, we are in general agreement as to not exceeding the limits fixed by the rule of Becquère, which is, to cause to be absorbed, at each sitting, the quantity of rays compatible with the integrity of the skin.

This is the practice we have adopted, and which, combined with marine treatment, has given us, in certain cases (fig. 978 and 979) excellent results.

Instruments.—Rochefort transformer of 45 cm. spark, with condenser and trembler.

Chabaud ampoule with osmo-regulator.

Villard's valve.

Continuous current; 110 volts at the primary.

Becquère's Sparkmeter.

Sabouraud's Radiometer.

Drault's Localiser.

Method of Operating.—The ampoule is regulated by means of the osmo-regulator, in such a way as to give a spark of about 3 cm.; it is placed at a distance of 10 cm.

Localisation.—The localiser of which we dispose permits of the easy limitation of the zone of irradiation, but it is not indispensable. A very simple

or again, **if the friends insist**, you are laid under the necessity of interfering in one way or another.

In these cases, which are, fortunately, the exception, one



Fig. 979.—The same after six months of purely conservative treatment. In place of five large glandular masses, there remains only a small gland scarcely visible (which in its turn completely disappeared four months later, ten months after the commencement of the treatment).

procedure consists in making, over the region, a negative mould, in plaster, —one protects the parts to be moulded with a layer of cotton wool of 1 cm. in thickness, regularly spread, and one lays over all some squares of plaster tarlatan (see p. 97—the method of taking a mould) exceeding considerably the limits of the affected zone. For cervical adenites, the mould ought to cover entirely the corresponding half of the head and to descend to the middle part of the thorax, taking in the stump of the shoulder. Furnished with lead leaf on both faces, pierced with openings opposite the affected glands, the negative constitutes a very satisfactory localisator.

Number of sittings.—We give a first series of three sittings (one per day,

ought not, any more than in the others, to extirpate the gland. It may be that the patient, in spite of all that you have said to him, begs for extirpation, and wishes to force you to operate.

Reason with him,¹ show him that there is only one rational treatment, which is, to excite artificially resolution or softening, which are both methods of cure without cicatrix.

You know already how to effect that. We have seen, in Chap. III. p. 163, the technique of the injections in dry and granulating tuberculoses. It is a singular thing, the same agent (camphorated naphthol) can, according to the case, and especially according to the number of the injections, produce either resolution or softening.

(a) *The method of procuring the hardening and re-absorption of the gland.*—If for example, one injects only from four to six drops of camphorated naphthol, and only on every three or four days, until there have been ten injections, one promotes the hardening instead of causing softening, but the sclerosis is not produced immediately, nor even during the period of the injections. On the contrary, **the gland swells during that period.** It is only after three or



0.5 For 4.7

Fig. 980.—One may soften an adenitis by injecting into the centre of the gland a few drops of camphorated naphthol.

for three consecutive days) in such a way that we obtain, at the end of the third, the maximum tint indicated by the apparatus of Sabouraud and Noiré. After each sitting, the pastille indicator is carefully put aside and kept in the dark until the following séance. *After the third séance, rest for one week.*

The treatment is continued afterwards at the rate of *one sitting per week : each of these sittings lasts from eight to twelve minutes, interrupted a little before the Sabouraud pastille has reached the standard tint.*

¹ Unless one is treating a person to whom the question of a visible cicatrix is of slight importance, for instance, an adult labourer.

four weeks after the tenth and last injection that the gland begins to diminish in volume, and it is only four or six months after the cessation of the injections that one observes the complete, or nearly complete, disappearance of the glandular tumour.¹

(b) *Method of obtaining softening of the gland* (fig. 980 and 981).—But if one injects from 10 to 20 drops of camphorated naphthol every day, one will have, on the fourth or sixth day, in the centre of the gland, a sensation of elasticity or even of distinct fluctuation. It indicates that the softening sought for has been produced.

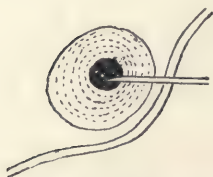


Fig. 981.—The liquid creates in the centre of the gland a cavity which enlarges little by little, by successive softenings of the various layers of the parenchyma of the gland.

I repeat that it is better to look for softening than for sclerosis. Softening permits one to obtain, with punctures, more complete and more perfect cures.

Beginning from the time when softening is obtained, it is evident that the case becomes one of ordinary cold abscess.

If indurated points remain, you will follow them up with new injections of camphorated naphthol without being possessed with the idea of softening at any price, so long as there are the smallest vestiges remaining; you may ignore the débris, which will disappear completely in the long run, or nearly completely, by progressive hardening.

3RD VARIETY.—OPEN OR ULCERATED ADENITES

The patient arrives with ulceration already present. Well, even in that case, one generally gains, from the æsthetic point of view, by having recourse to conservative measures rather than to surgical operation (see fig. 982 to 984).

The conservative measures are Vigo plasters, powders, slight

¹ One may also obtain hardening by injecting into the gland, instead of camphorated naphthol, a mixture of oil, creosote and iodoform (see p. 165).

applications of nitrate of silver pencil, radiotherapy and some prudent modifying injections (made every 3 or 4 days with



Fig. 982.—If, in spite of everything, the skin gives way in the course of treatment, or, if the patient comes with an open abscess, slight conservative measures are of still more value than extirpation; one sees in the pointed lines the limits of the incisions which one would be obliged to make to perform extirpation of the gland (compare with fig. 984).

4 or 5 drops of liquid). The cure is at last obtained in this way—provided the environment is good.

THE TREATMENT OF CICATRICES

As to the treatment of cicatrices left by surgical operations, you should know that it is practically nil.



Fig. 983.—Cicatrix which would be produced by such an intervention, whilst, if one does not operate upon it, there will remain only two small points, almost invisible.

However, you will find many treatments described : radio-therapy, local massage, injections of paraffin, surgical extirpation

of the cicatrix in order to produce a new cicatrix less unsightly, I have tried them all; but I have generally obtained only unsatisfactory results.

You may try them also, but I advise you not to promise great things, and to mistrust above all extensive operations, so-called



Fig. 984.—The skin of this young girl, already blue on arrival had, in spite of all precautions, broken down in the course of treatment; the cicatrix of the wound, treated by slight measures, is scarcely visible. (Compare with the cicatrix in fig. 982 and 983.)

æsthetic, for it will frequently happen that, in trying to efface the mark, you will aggravate it; and you will see another keloid more extensive succeeding to the small keloid cicatrix extirpated; that is to say that, when the mischief is done, it is often too late to remedy it, and women thus disfigured will seek

vainly all their lives to repair the irreparable outrage of the surgeon.

Conclusion

Fortunately, a cicatrix on the neck is infinitely more easy to avoid than to obliterate. •

One can always avoid it, or almost always, with the therapeutics which I have described. The treatment demands without

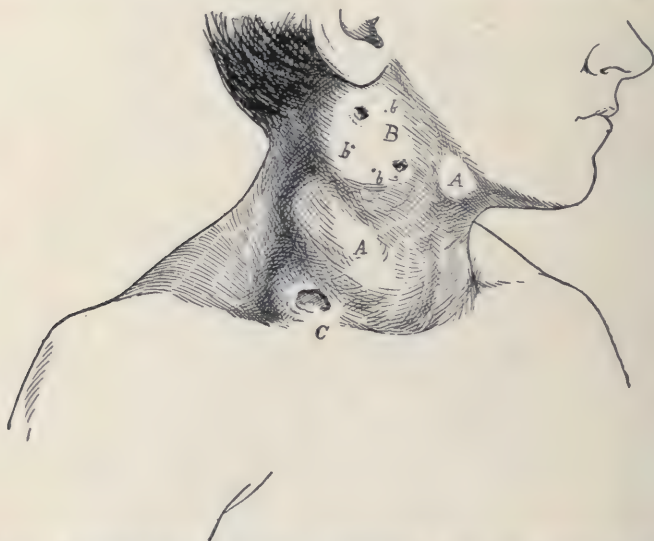


Fig. 985.—Fistulous cervical adenitis. Some glands have been opened (B and C). Other glands (A) are softened but not opened. One makes at A injections and punctures; at B injections at the points b; at C. slight cauterisations and dressing.

doubt, a minuteness, an effort, a perseverance, and especially an expenditure of time, much greater than **surgical extirpation**, however rapid and brilliant: but extirpation **leaves an indelible mark, whilst our treatment cures without leaving traces.**

To cure adenites in this way is a result so good, that it seems to me practitioners should take a little trouble to obtain it.

CERVICAL ADENITIS.

EVEN IF A FISTULA EXIST, DO NOT OPERATE.



On arrival at Berck this patient had a fistula 8 mm. in length and 4 mm. in breadth. It was slightly below the mastoid process, one finger's breadth behind the lobe of the ear. The treatment was by injections. The cure is so complete that one can only imagine there has been a fistula. No surgical operation could have left so few traces and given such a result.

[To face page 916.]

He left then for Switzerland, where a third operation was performed: a third recurrence; then a fourth operation, and a fourth recurrence. The more they operated, the more active it became, and each new intervention only gave new life to the tuberculous lesion.

Here is the patient (fig. 986), after the fourth operation, on his arrival at Berck, presenting an enormous tumour which gave him, in



Fig. 986a.—The same—a year later, after having followed our treatment by injection.—Complete cure (without a new cicatrix).

truth, much more the appearance of a person with lymphadenoma than with a tuberculous polyadenitis.

It is no longer only the left side which is affected. After the last intervention, the right side—until now free—is attacked in turn! (See fig. 987.)

And to think that they wished to operate again! This time the patient was no longer agreeable to this at any price.

Shortly afterwards he arrived at Berck.

And now look at him (fig. 986*a*), a year later (after he had followed our treatment by softening injections, the technique of which you know, see p. 207).

We attacked this great polyglandular tumefaction (in the way that it will be necessary for you to proceed in similar cases), namely, by islets, by successive portions.



Fig. 987.—The same; seen on the right side—on his arrival at Berck. An adenitis on the right side had appeared, following the fourth operation performed on the left side).

The treatment of each portion occupied four weeks. After which we allowed three or four weeks' rest, so that the treatment of the entire tumour occupied from six to seven months.

One can see that the result is complete. This obstinate and grave polyadenitis has been perfectly cured (fig. 986*a*).

Here is the right side of the same patient on his arrival at Berck (fig. 987).

The left side has been treated and cured like the first, but much more easily and much more quickly, in two months and a half.

On the right side one does not see anything of the cicatrix; it, very fortunately, had not been operated upon, whilst on the left side one perceives the traces (alas, ineffaceable) of the four operations which the patient had undergone elsewhere.

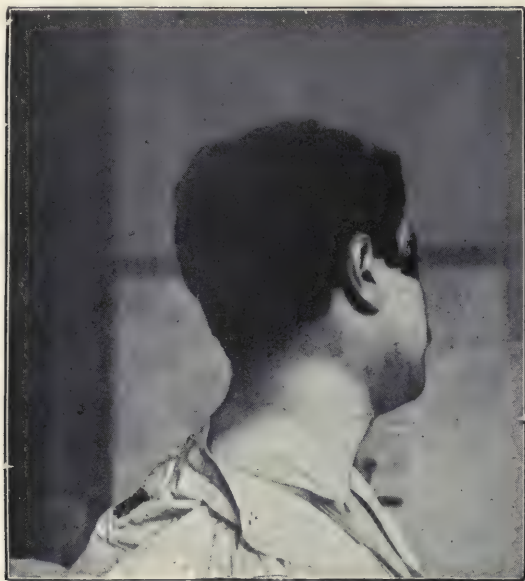


Fig. 987a.—The same on the right side, fortunately not yet operated upon. Here he is, after one year of our treatment by injections. — Cure perfect and without cicatrix.

Indeed, this case teaches us another lesson; namely, that it is not absolutely necessary, in order to obtain the solution of a hard adenitis, that it should have at its centre a trace of caseation, or the commencement of a cavity.

Without doubt that condition, when it exists, is very favourable and facilitates much the complete liquefaction of the gland under the action of our softening liquids. But the condition is not absolutely requisite.

There was here no trace of a cavity, no commencing caseation, and nevertheless, the cure has been obtained quite completely.

It is true, you will say, that he had, to assist his cure by injections, the precious advantage of a sojourn at Berck. Yes, without doubt, but when he submitted to the last two operations the patient had already passed a year in Switzerland, which had not prevented recurrence.

CHAPTER XIX

THE OTHER¹ EXTERNAL TUBERCULOSES

- A. Cold Abscesses.—B. Tuberculous Osteites.—C. Pulpy Synovites.—D. Spina Ventosa.—E. Tuberculosis of the Testicle and of the Epididymis.—F. Tuberculosis of the Skin and Tuberculous Lupus.

A.—COLD ABSCESS

I.—Diagnosis of a Cold Abscess. Utility of Exploratory Puncture in Diagnosis

Cold abscess is met with in two different forms :

1ST FORM.—*Some one comes to consult you for a large swelling* which has appeared and developed without fever or appreciable pain (or scarcely any) and is of a doubtful consistence, really difficult to decide upon : resilience or fluctuation ? mass, solid or liquid ? One does not know exactly which.

Then again, if there is fluid, is it a question of a cold abscess ?

I do not wish to study the diagnosis thoroughly, of which the details are found (more or less scattered, it is true) in all the books, but refer you only to the great resource, which is *exploratory puncture for all doubtful cases*. No, not for all the cases (I am mistaken), because there remains one situation where you will never have recourse to puncture to establish a diagnosis, it is the case of a possible hernia, that is to say, of a small swelling in the inguinal or crural region. The puncture of a hernia (!) would be disastrous. It is necessary for you then, in such a case, to arrive at a diagnosis without puncture. It is generally easy, but not always : I know of several instances here of mischievous errors in diagnosis. That is why it is my duty to point them out to you :

¹ That is to say, other than cervical adenitis of which we have spoken, and other than the three great tuberculoes (Pott's disease, coxitis, white swelling) studied in the first part of the book.

The Means of Distinguishing a Cold Abscess from a Hernia.

To avoid error, the first point is to remember the possibility of an error and the confusion sometimes arising between a hernia and an abscess. Having thought of it, one finds, on looking carefully, the differences in the objective signs, and especially as regards reducibility and reproducibility, in the history, in the concomitant phenomena, and in the indications given by an examination of the neighbouring regions.

Signs Common to both Abscess and Hernia (likely to lead to confusion).

As to seat : in the inguinal or crural region (or more rarely in the lumbar region, in the triangle of J. L. Petit).

As to reducibility : both disappear (more or less completely) under the pressure of the hand. Both alter in volume from time to time, according as the patient is recumbent or upright ; both respond to the impulse of coughing.

Percussion ?—One might be deceived by this.

Either there is a slight dullness : but a small hernial protrusion, surrounded by dull tissues, especially if it is situated below the crural arch, *may seem* to give slight dullness or even absolute dullness.

Or, there is "a slight resonance." But a small portion of an abscess, pointing, seated above the arch and surrounded by a coil of intestine, *may seem* rather resonant to percussion.

Consistence ?—Indefinite. Is there fluctuation or resilience ? The distinction is not always easy to make.

Those are the causes of error.

These are the elements of the diagnosis :

Differential Characters of Abscess and Hernia.

(a) **As to Hernia.**—*Careful palpation* enables one to decide that the tumour is elastic, resilient and supple as a balloon, and does not give the sensation of fluid. Gentle and repeated *percussion* enables one to say that the tumour is resonant and not dull.

Impulses on coughing and straining are transmitted here *very directly*, with an absolute distinctness.

Reduction is obtained under a certain pressure. It is obtained completely, it is obtained more or less suddenly, it is obtained with gurgling.

The tumour only reappears if the patient coughs or makes an effort. It reappears with a gurgle which is perceptible if one

places one's finger upon the region when the patient is made to cough.

When the tumour has disappeared, one may place one's finger into a track or a free opening.

And if one keep one's finger there while the patient coughs, the finger experiences at once the impulse of the cough.

The examination of all the adjacent organs (bones, articulations) capable of producing an abscess by gravitation is entirely negative.

(b) Signs Peculiar to Abscess:

Careful palpation gives a sensation of fluid, and not of *résilience* or elasticity.

Careful percussion, gentle and repeated, always reveals a slight dullness which one can make more evident if one percusses alternately the suspected point and the middle part of the abdomen.

The transmission of the *impulse* on coughing is not absolutely direct, as it is, for instance, over the middle part of the abdomen.

If there is *reducibility* under pressure, it is noticeable at once that the phenomenon is produced without any gurgle. And then it is not real reducibility. The tumour is depressible and can be "pushed" back, rather than is reducible. One feels, under the pressure of the hand, the tumour diminish slightly—but it does not disappear completely, all at once, brusquely. When one presses it no longer, the swelling reappears, at least partly, without any effort having been made, without any impulse from coughing; it reappears without any gurgle.

In the case of hernia, the tumour ceases to exist when it is reduced. One may look for it in the neighbouring points, but one does not find it; an abscess, on the contrary, still exists, is simply lodged elsewhere. On close examination one finds it in a neighbouring part, and one finds it, in fact, in the form of a distinctly fluctuating mass. If one presses on the opposite limits (of the mass) one pushes it aside, one sees it bulge out again, partly. If, then, one puts one's hand over the superficial part, whilst the other hand remains over the deep part, one may convey the sensation of fluid from one hand to the other (see fig. 119 and 120, p. 132).

As nearly always in this case, it is a question of abscess by gravitation—**symptomatic** of a lesion of the spine or of the pelvis—one finds a history of pain of more or less long standing, experienced by the patient, and mistaken, quite often, for lumbago or rheumatism or sciatica. One finds also, nearly always, on looking carefully, distinct signs on the side of the bones, namely a prominence, or

pain on pressure over the vertebræ, the joints, the iliac bones or the hip.

Finally, if you have radiography at your disposal, it will generally give you, in the case of abscess, an appreciable shadow indicating the existence of a collection having the form and direction of the psoas muscle, whilst it is negative in the case of hernia.

Here, then, are more signs than are necessary for you to make the diagnosis between cold abscess and hernia—in the sole case, I repeat, where you are not able to make use of the exploratory puncture.

In all other cases, when you are still in doubt as to the existence of an abscess, make use of puncture.

2ND FORM.—Neither the patient nor the parents mention any swelling ; it is for you to think of it, for you to look for an abscess, because you are treating the patient for a tuberculous lesion (Pott's disease, coxitis, etc.), which is very apt to cause an abscess by gravitation. You will look, then, for a possible abscess, you will look systematically at each visit—by careful palpation of the affected region, palpation which you will extend to the neighbouring regions, for there are migratory abscesses, more or less aberrant.

Thus you will trace “wandering abscesses” or “abscesses by gravitation”—because you have looked for them—since one generally finds only what one has sought for.

Supposing that you have found, close to a certainly tuberculous focus in a bone or joint, an abnormal swelling, a puffiness more or less circumscribed. Doubtless it may only be a tuberculous swelling, but is it an abscess already formed or one only in process of forming ? for abscess is only, in a way, the third stage of the tuberculous new formation which, in its first stage, consists of solid granulations, and in the second, of caseous matter not yet liquefied.

Well, palpation generally allows one to make the diagnosis. In the first stage (that of granulations) one finds an elastic resiliency ; in the second stage (that of caseous formation) a consistence of paste or mastic ; in the third (that of abscess) true fluctuation.

If the perception is not very distinct, if there remains some doubt, have resort here to exploratory puncture—which may give you pus in some case where palpation has not given you fluctuation. For instance, in the case of an abscess bound down or flattened against a bone by an aponeurosis or firm capsule. One has here no perception of fluid, but only one of resiliency, sometimes only of wooden hardness. Doubtless, in this case, a large clinical experience enables

one to suspect the very probable existence of an abscess, but only exploratory puncture will enable one to **affirm it**.

Exploratory Puncture.

An exploratory puncture is harmless, provided that it is made with all the aseptic precautions already indicated for ordinary puncture (see Chap. III.).

For exploratory puncture, one provides oneself with the No. 3 needle and our aspirator, not the small Pravaz syringe, which, the needle being too small, will not allow of the passage of the liquid.

It is the same in abscesses of which the contents are very thick, which necessitate the use of the No. 4 needle; but one ought to commence with No. 3 and not use No. 4 unless the result with No. 3 is negative.

One commences by making sure that the needle is permeable and that the aspirator has been emptied.

The Puncture.—At a few centimetres outside the superficial zone of the swelling, you puncture the **skin** directly, with one sharp push, then push the needle gently, following an oblique course in the direction of the tumour, until you experience the sensation of entering the main swelling. Already, from this moment, you are informed of its nature, whether solid or liquid, by the sensation you experience.

If the tumour is solid, the needle has difficulty in penetrating it, and its point becomes embedded. If it is liquid, the point penetrates easily and moves freely about.

Often, before any aspiration, one sees immediately a flow of serum or pus coming through the needle. You have learned something; it is useless to push your search further, useless to attach the aspirator to the needle—unless you wish to profit by the occasion to make, at once, the first puncture and the first injection into the abscess.

If nothing escapes, or only a drop of blood, one need not conclude that there is no abscess, before having made an aspiration.

You therefore adapt to the needle the aspirator previously prepared (in which a vacuum has been made) and you turn the cock.

Then three things may happen.

Pus may come, or blood, or there may be nothing.

The Interpretation of the Result of Exploratory Puncture.

It seems, *a priori*, that nothing could be more easy than to interpret the results given by an exploratory puncture, and that

everything turns upon this : should pus come, there is an abscess ; should it not, there is no abscess.

Alas ! undeceive yourself ! It is not so easy as that in clinical work, at least very often ; the causes of error are numerous.

We have seen, at our vacation courses, well-informed practitioners who have only succeeded in making negative punctures, or who have only withdrawn blood, in cases of very manifest abscess.

Why ?

That is what it is necessary for us to explain. To be really useful, we shall be obliged to enter into very minute details, perhaps a little long, perhaps a little fatiguing to read, but which are indispensable to know well, if one wishes to avoid very mischievous errors.

1st. **Pus or Serosity is withdrawn.**

Evidently, if it is *pus*, it comes from a cold abscess. If it has been formed without fever, or only with very slight fever up to about 100°, and almost without pain, the diagnosis is made.

If there is a *serosity* containing clots it is again a cold abscess.

It is still an abscess, if *serum* without clots escapes (something similar to the fluid of a hydrocele or a hydrarthrititis).

Even when the liquid has all the appearance of *cystic* fluid, it may be a cold abscess, generally chronic. The diagnosis is then made from the concomitant symptoms.

When the aspirator withdraws nothing, do not conclude all at once that there is no abscess. Before affirming there is none, make sure that the extremity of the needle is really in the swelling, and not on this side or on that ; then remove the needle to see that it is not blocked, which is often the case, by broken down granulations or by caseous matter (in the last case, in spite of the fact that no liquid has come, it is still an abscess which may not yet be matured). One will not mistake for caseous matter small globules of fatty debris which sometimes block up the needle, especially in stout people, and are derived either from the tumour itself, which is a lipoma, or from the sub-cutaneous panniculus adiposus.

2nd. **Blood is withdrawn.**

It is most often a neoplasm, but it still may be a cold abscess.

If it is *one drop*, or only a *few drops* of blood, that may as easily proceed from a mass of tuberculous granulations as from a neoplasm.

If a certain quantity of blood flows (for instance, a tea-spoonful

or more of red or bluish blood) it is nearly always a neoplasm. However, here again it might possibly be a question of an abscess, for the puncture of an abscess produces blood when one runs into a venule or an arteriole in the interstitial tissues or in the wall of an abscess, but then, nearly always, there will soon be mixed with the blood some drops of pus, which will enable us to make the diagnosis (see, in Chap. III., The Accidents of Puncture).

When not even a drop of pus appears, when there is only blood, one may make the diagnosis between tuberculous neoformation and neoplasm from the other symptoms.

For example: if one has punctured a very large abdominal tumour and drawn only blood it is almost certain to be neoplasm (sarcoma, lymphadenoma, etc.), and not tuberculosis, because a tuberculous mass of such dimensions would be broken down in the centre. On the contrary, when one punctures a small cervical gland, mobile and not very hard, if one withdraws only blood, one does not therefore conclude it is a neoplasm, but rather a tuberculous adenitis, not yet suppurated.

Similarly, if one withdraws blood from a swelling developed near a joint or a bone which **one knows to be attacked by tuberculosis**, one should conclude, in spite of the fact that only blood has issued, that it is a tuberculous mass not yet broken down, and not a neoplasm.

It is not the same when the diagnosis of the nature of the disease of a bone or of an articulation has not yet been made: for example, a patient may come to you with a tumour which is resilient, or fluctuates or appears to fluctuate, which has developed very rapidly (in a few weeks or a few months) round a bone or a joint: one hesitates between the diagnosis of sarcoma and tuberculosis.

One punctures this softish and bossed swelling: if blood is found, it is probably a neoplasm, because a tuberculous neoformation of a certain size, as we have said, will produce at least a few drops of pus.

We may add that, if one can, very exceptionally, find blood in the cavity of a cold abscess, the blood is blackish, already more or less modified, full of small clots, and often contains drops or traces of pus (see Chap. III.).

But, in all these cases, I repeat, one has, in order to establish the diagnosis, something besides puncture to help us, one has the assistance of concomitant symptoms.

3rd. **Nothing appears** (in spite of the fact that you are assured that the aspirator was exhausted, that the needle was permeable, that it was there you had felt the swelling; in the end you have withdrawn the needle and seen that it contained no débris, pulpy or caseous).

Before affirming that there is no abscess, remember that some pus from cold abscesses is too thick to flow through the needle No. 3. You ought then to make a second puncture, this time with needle No. 4.

But needle No. 4 does no better.

This time, having been assured by a new palpation that a tumour really exists, that it is not a phantom tumour, you are forced to the conclusion that there is no abscess, that it is, in fact, a solid tumour. Lipoma, Myxoma, Neoplasm? The diagnosis is made from all the other existing symptoms, but we need not study it here. We have here only to establish whether there is an abscess or not, which is done.

If we recapitulate what ought to be learned from puncture of a mass situated round a joint or a bone recognised as tuberculous, we see that we have elicited, according to the case, three different facts.

Either the needle has withdrawn nothing, and it is a question of granulations not yet softened;

Or the needle has withdrawn some débris of whitish material, which is an indication that the tumour has already commenced a caseous degeneration;

Or it has withdrawn some drops of pus or of serum, with or without clot; then the existence of an abscess ready for puncture is evident.

The Diagnosis of the Origin of the Abscess.

You have recognised the abscess. A second question is placed before you: that of inquiry as to whether it is essential or symptomatic (that is, symptomatic of a glandular lesion, or of an osseous or articular lesion until now unsuspected).

For instance, in the case of an abscess of the cervical region, one ought to establish whether the abscess is idiopathic (developed in cellular tissue), or whether it is a suppurated adenitis, or whether it comes from an adjacent osteitis, which is, in fact, almost always a Pott's disease.

Again, for instance, in the case of a cold abscess of the thigh, you ought to find out if it is essential or symptomatic, and it may be symptomatic either of an inguinal or iliac adenitis, or of an osteitis

of the femur, or of the pelvis, or of a coxitis, or of Pott's disease (either sacral, lumbar or even dorsal).

To know which it is, examine carefully the joints and bones in the vicinity of the abscess.

The question of the origin of the abscess is certainly worth the trouble of being raised and threshed out, if only to institute the orthopædic treatment of an osseous or articular lesion, often until now overlooked.

From the point of view of the treatment of the abscess itself, there is not, fortunately, any difference between idiopathic and symptomatic abscesses. The only rational treatment for all of them is puncture and injection.

So that, even if you have been deceived, in some exceptional case, as to the origin of a cold cervical abscess, if you have thought of a simple adenitis that has softened, when in reality it is a question of an abscess due to Pott's disease, the damage will be nil, or almost negligible to your patient, because you will treat all abscesses by the only method, that of puncture and injection, which cures them all, whatever be their origin, idiopathic or symptomatic.

But the same impunity and harmlessness is not assured to practitioners who *open* cold abscesses. They, when they are deceived as to the origin of an abscess, when they open an abscess by gravitation in Pott's disease, thinking it is a matter of a broken-down gland, commit an error which may be disastrous to the patient, for if the opening of an idiopathic abscess, of a suppurated adenitis, is a reparable evil, on the contrary, the opening of an abscess in Pott's disease has, as you know, for its ordinary consequence, the death of the patient at an early or later date.



Fig. 988.—Large subcutaneous abscess of the left popliteal space.

The Treatment of Cold Abscesses

We have nothing, or next to nothing, to add to what has already been said upon this subject in Chaps. III., IV., V., VI.,

and VII. of this book, upon the treatment of symptomatic abscesses and idiopathic abscesses.



Fig. 989.—Squares of damp absorbent wool arranged for the compression of the abscess after a series of punctures.

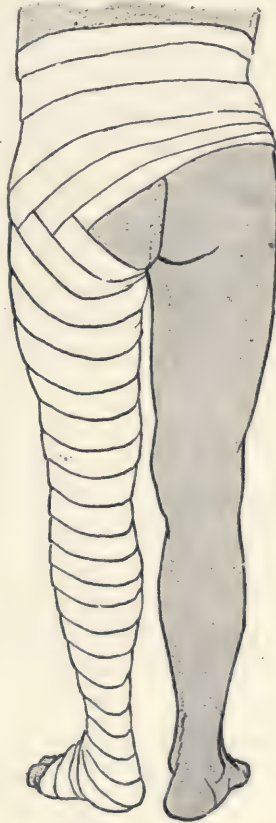


Fig. 990.—Compressive bandage commencing at the toes to produce the approximation of the walls of an abscess of the thigh or the groin.

The treatment of both is identical. The difference in their origin does not alter in any way their treatment.

There is only one treatment for cold abscesses; that of punctures and injections.

Drainage, even in the case of a very accessible abscess (fig. 988), and widely performed, does not ensure against a relapse, which will always supervene either immediately, the wound failing to close by first intention, or after a few weeks or months, consequent upon the rapid increase of granulations in the deeper parts.

I do not speak of bacillary inoculations at a distance, of lung or of brain, nor of tuberculous colonisations or generalisations, always possible after surgical drainage. (I do not wish to exaggerate the danger, which is small, I admit, but nevertheless real.)

On the contrary, the treatment by puncture and injection cures certainly, cures relatively quickly (in 6 or 7 weeks), it presents no risks, it is easy of application for all, by all and everywhere.

The *technique* is that already indicated in Chap. III., where we have given the nature of the liquids to be injected, the number of sittings and the intervals between them.

After the seventh puncture (this is not followed by injection) one compresses methodically the walls of the abscess with squares of wool, placed cross-wise, and Velpeau bandages, by causing the compression to begin at the extremity of the member, in order to avoid oedema of the hand or foot (fig. 989 and 990). Every four days, one adds one or two new Velpeau bandages, in order to keep up compression at the desired degree.

By this compression, energetic and methodical, continued for 15 or 20 days, one causes the approximation of the walls of the abscess, which means complete cure.

B.—TUBERCULOUS OSTEITIS

We have mentioned in another part of the book the treatment of tuberculous osteo-arthritis. One may surmise, from that, what will be the treatment of tuberculosis of any bone whatever, when easily accessible (fig. 991).

(a) In the case of an **abscess** already formed (appreciable

periosteal abscess), one makes punctures and injections in the ordinary way.

(b) In the case of pulpy osteitis **without abscess**, one looks for hardening or softening of the accessible granulations in the bone or in the periosteal tissues.

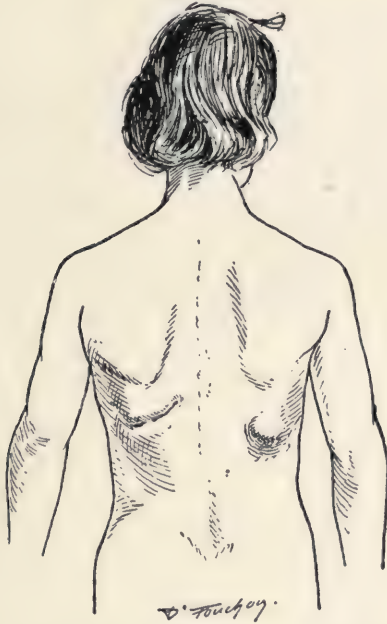


Fig. 991.—Costal tuberculosis with two foci, one on each side, almost symmetrical, operated on and become fistulous on the left side; abscess closed on the right. The closed abscess has been cured by punctures and injections; the fistula on the left has been cured also, a little later, by our paste injections of creosote, iodoform and camphorated phenol (see p. 172).

One knows by what means this hardening or softening is accomplished (see p. 160).

C.—TUBERCULOUS TENO-SYNOVITIS, SYNOVIAL CYSTS AND HYGROMATA

(a) When effusion of liquid has occurred (for example, in the synovial cysts of the sheaths of the hand), the treatment is

that of ordinary cold abscess (figs. 992 and 993); if there exist rice-shaped grains, too large to pass through the needle No. 4, inject camphorated naphthol, which will dissolve them in a few days.

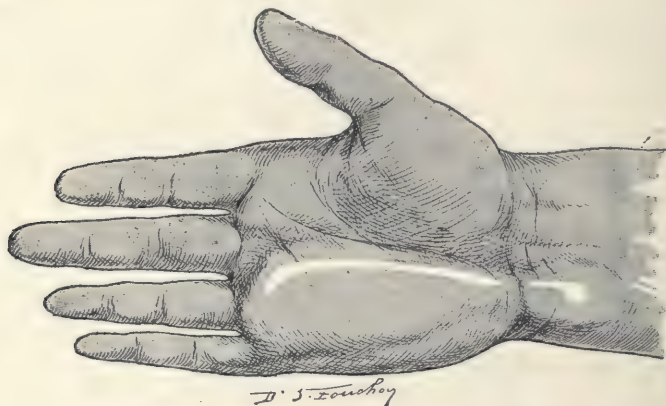


Fig. 992.—Pulpy synovitis of the palm of the hand.

(b) In synovitis *without effusion*, one promotes hardening or softening of the granulations, by injecting iodoformed oil or

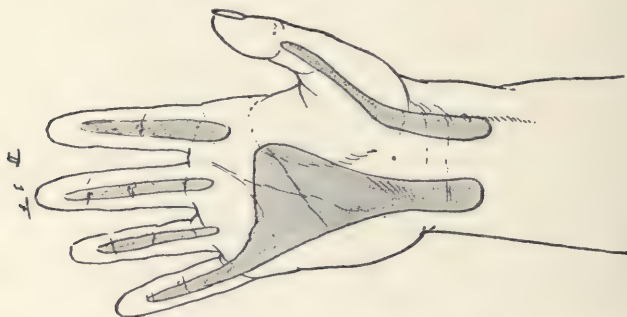


Fig. 993.—Synovial sheaths of the hand.

camphorated naphthol into the actual cavity of the serous sheath, as if one were dealing with a white swelling, which practically is an articular synovitis.

But especially, *no surgical operations which, here again, rarely cure, often aggravate and always mutilate.*

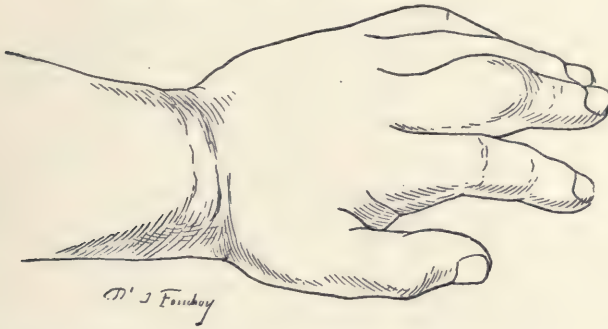


Fig. 994.—Spina ventosa of the second phalanx of the middle finger.



Fig. 995.—Spina ventosa of the first phalanx of the index and little fingers.



Fig. 996.—The same seen on the dorsal aspect.

Extirpation, if it is to be at all complete, causes exfoliations or tendinous necroses, bringing in their train grave functional weakness.

D.—SPINA VENTOSA (DACTYLITIS)

Know that, if one takes *en bloc* all the cases of spina ventosa, one-third are syphilitic, one-third are mixed, that is to say, are scrofulous and syphilitic (see p. 962), and one-third only purely tuberculous.

You must, in *all cases* of spina ventosa, commence by insti-



Fig. 997.—From radiograms.

1. Sound finger. 2. Spina ventosa of the first phalanx, the bone is expanded and crowded with granulations. 3. Two-thirds of the bone have disappeared; what remains communicates with the exterior by a fistulous track.

tuting a *test treatment* with mercury or iodide of potassium, but pushing more particularly the iodide (see p. 964).

This specific treatment will give *once in three cases* a complete cure, and in another third, a manifest improvement.

In a case of tuberculous spina ventosa (figs. 994 to 999) which has shown itself obstinate to specific treatment, you will carry out the general and local treatment usual in all the external

tuberculoses—taking constant care to safeguard the integrity of the skin, here so near to the affected bones.

It is necessary, therefore, to attack the focus only by very careful injections, in doses of a few drops, the injections extended and made each time at different points.

And, for the same reason, one must in a general way prefer creosote and iodoform to camphorated naphthol, which, by causing a very lively reaction, might compromise the vitality of the integuments, sometimes already damaged by tuberculosis.

As in coxitis, one will make the injections **from the begin-**



Fig. 998.—Spina ventosa of the middle finger cured, one phalanx being destroyed.]

ning of the disease, if one wishes to prevent the softening of the bones, which conduces inevitably to their destruction.

“At the beginning,” does not mean at the first small thickening of a millimetre of the phalanx, at that stage one simply applies round the finger a layer of one or two millimetres of mercurial ointment, but one will commence the injections immediately afterwards as soon as the lesion has shown a manifest tendency to progress (fig. 997, 2).

Orthopædic Treatment of Spina Ventosa (see figs. 999 to 1001). One ought to support, to prop up the affected bones, in order to avoid spontaneous fracture.

At the beginning, then, mercurial ointment and a plaster case.

Later, when one makes the injections, one again applies a **plaster**, with openings at the proper places for the injections.

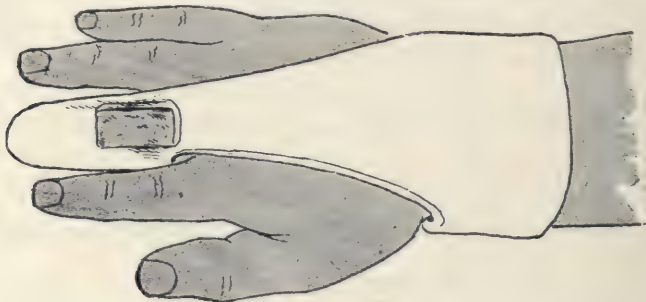
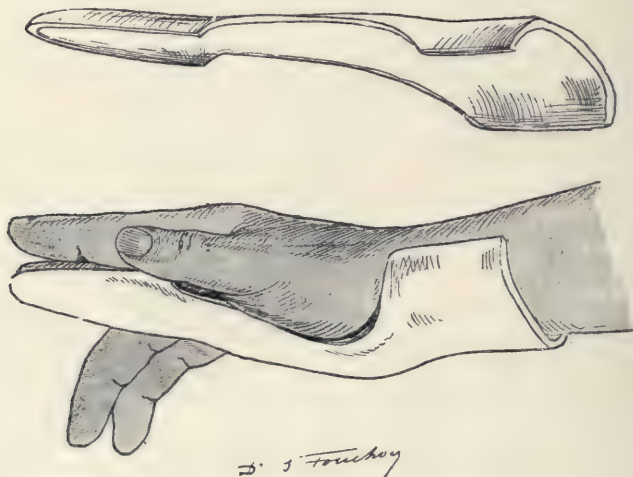


Fig. 999.—Fenestrated apparatus for spina ventosa.

The same again in the case of fistulæ, one applies a small fenestrated plaster. But if there are too many open foci, it



Figs. 1000 and 1001.—Bivalve apparatus for spina ventosa.

may be better to divide **the plaster into two valves**, which one can remove and replace at each dressing (figs. 1000 and 1001).

E.—TUBERCULOSIS OF THE TESTICLE AND EPIDIDYMIS

This tuberculosis ought also to be treated by conservative means (punctures and injections).

At the beginning of my practice, I operated upon such cases as most surgeons did and unfortunately are still doing.

For eighteen years, I have not performed any castrations: I use exclusively injections, and, in more than 200 cases of children and adults thus treated, I have not had a single failure.



Fig. 1002.—Tuberculous epididymitis on the left side. The tinted zones represent: on the right, the limits of the normal epididymis: on the left, the limits of the affected epididymis.



Fig. 1003.—Tuberculous epididymis. 1, 2, 3, 4, 5 points where one must make injections (sometimes at one point, sometimes at another).

And I include in this number, not only closed tuberculoses, but also all fistulous tuberculoses, which account for about one-third of the total list.

The cure required from 2 to 4 months for the closed tuberculoses, and from 3 to 10 for the open tuberculoses.

Treatment in addition to that required for adenites (p. 897).

1st. **Closed tuberculoses** (figs. 1002 and 1003).

One proceeds to sclerose them or to soften them. On account of the peculiar sensitiveness of the integuments, I recommend here, especially for lesions only skin-deep, **to look for sclerosis** (oil, creosote, iodoform), **rather than softening** (camphorated naphthol, with which one courts a slight risk of damaging the skin).

2nd. Suppurated Tuberculosis.

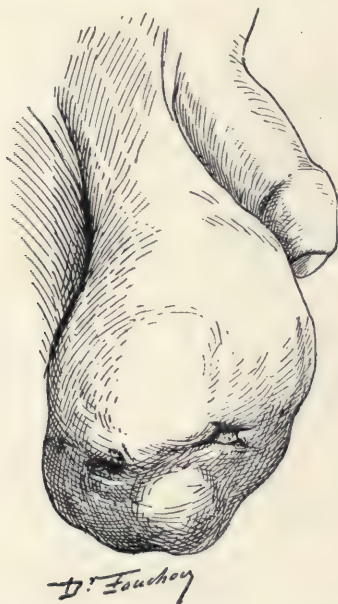


Fig. 1004.—Tuberculous epididymitis with fistulæ. Treated by paste injections.

Punctures and injections as in all cold abscesses.

3rd. Tuberculosis with fistulæ (fig. 1004).

Injections of our paste (see pp. 165, 177, 213, and fig. 184, p. 218).

In the case of **hydrocele** symptomatic of a **tuberculous lesion**, you will make punctures and injections into the tunica vaginalis, as in an ordinary cold abscess. In four out of six cases observed, an injection of paste was sufficient to bring

about the cure of the adjacent epididymitis, without directly treating it; in the two other cases, we treated the epididymis afterwards (by supplementary injections), as if the lesion had been isolated.

I repeat that I have arrived by these methods, on every occasion, at a cure, very simply and without any risk of tuberculous generalisation, which one is not certain of, by any means, in castration. I know a considerable number of cases where one has seen it appear, some months after the operation, either as phthisis or as cerebral tuberculosis.

I do not dwell upon the mutilation, so painful and so humiliating, which castration entails, and especially double castration! Besides, tuberculosis so often involves both sides, either simultaneously or in succession.

**F.—TUBERCULOSIS OF THE SKIN.
LUPUS, TUBERCULOMA—CUTANEOUS
OR SUB-CUTANEOUS ADENITIS—OTHER
THAN CERVICAL**

In the case of tuberculoma, follow the treatment *in a general way* as in the case of a cervical adenitis (p. 897).

Nevertheless, there are some cases where the mass to be softened or sclerosed is considerable (of the volume of a large nut, for example). Where it is found in such a region that the question of a visible cicatrix is of no importance; where the patient belongs to the working class, and finally, where the tuberculoma is very easy to extirpate in its entirety—I agree that in these particular cases, the danger of relapse or of inoculation and the other inconveniences of operation, are really so small that they are practically negligible, and ablation, here, is permissible.



Fig. 1005.—Bacillary focus opened spontaneously opposite the malar bone; injections given by pricking the sound skin; one may give the injections in a circle around the focus.

It is not the same in the case of **ulcerated lupus** of the face or neck. The skin is too widely infected for one to think of surgical extirpation.

After having employed a specific treatment as a test treatment (for these lesions are syphilitic or very often mixed, in the same proportions, obviously, as in spina ventosa, see p. 936), I attack these lesions by a circle of sub-cutaneous injections of a few drops of oil, creosote and iodoform or of camphorated



Fig. 1006.—Lupus of the face; 1, 2, 3, 4, 5, 6, 7, points where one will make the injections of 3 or 4 drops of camphorated naphthol,—one injection every two days up to 10 injections.

naphthol (one injection daily, alternating the two liquids), I dress the wounds with Vigo plasters or naphthalin, and I employ, concurrently, radiotherapy (see fig. 1006).

If you have no X-ray installation, you can arrive at a cure by the other methods mentioned.

Cicatrisation is thus produced nearly always in the space of a few weeks—with a minimum of traces.

A Case of Tuberculous Lupus treated by X-rays



Fig. 1007.—Tuberculous Lupus of the face and neck, dating 4 years. Condition of the patient on arrival at Berck.



Fig. 1008.—After eight sittings at the X-rays on the face (date May, 1905).



Fig. 1009.—After 15 sittings for the face and 5 sittings for the neck (date July, 1905).



Fig. 1010.—Condition of the patient in September, 1905.

One treats in the same way (by sub-cutaneous injections of a few drops of liquid) non-ulcerated lupus; one arrests it, one overcomes it, and one cures here again with the minimum of "scars" because, after the injections, the skin gradually recovers a nearly normal coloration.

A Word on SPOROTRICHOSIS and its diagnosis from Tuberculosis and Syphilis

When examining a gumma, or an ulcer, or a cicatrix, or a cold abscess, one ought always to discover if it is a question of tuberculosis or of syphilis. We have already spoken of this diagnosis (see p. 213) and we will return to it later (see Chap. XVIII.).

But there is a third malady of which it is necessary to think in the same way, it is sporotrichosis—which one is not allowed to ignore, after the work of modern dermatologists, in particular that of Beurmann and Gougerot, who have revealed this malady to us.

Sporotrichosis is so frequent,¹ it causes lesions cutaneous and sub-cutaneous which have such a resemblance to tuberculosis and syphilis, that the diagnosis ought to arrest us for a moment.

Like tuberculosis and syphilis, sporotrichosis is seen here² under four forms: gummata, ulcerations, cicatrices and cold abscesses.

How is one to recognise the traits of sporotrichosis in the different lesions? The first condition for the recognition of sporotrichosis is to think of it; for its clinical manifestations are not so characteristic that its diagnosis forces itself upon you; no, you will not find it unless you look for it. And you look for it by attending first to the clinical signs; second, to the test treatment (the treatment by the iodides); third, the culture of the pus (which is here particularly easy and practicable for all practitioners).

I.—Clinical Diagnosis

When one examines a case carefully, one may note some clinical differences (well indicated by Gougerot) between the lesions of sporotrichosis and those of syphilis and tuberculosis.

1. **Gummata** (or nodules) of sporotrichosis.

(a) Their *number* is much greater than in syphilis or tuberculosis. It is generally from six to twelve, but it may reach 30, 40, 50 and sometimes more than 100, while in syphilis (or tuberculosis) it is rarely more than two or three.

¹ Gougerot goes so far as to say that the disseminated gummata of sporotrichosis are more frequent than the gummata of syphilis and tuberculosis, with which they were formerly often confused.

² For sporotrichosis may also produce lesions of the bones and viscera, but these are not yet well understood.

(b) Their *situation*.—In sporotrichosis, the gummata are disseminated all over, but especially about the upper limbs and the trunk.

In syphilis they are situated rather in the lower limbs.

In tuberculosis they are especially collected in the glandular regions or very near to bones, for they are generally in relation with lesions of the bones or of the glands.

(c) *Local characters*.—In sporotrichosis, the lesions are well delimited and very hard, movable at their bases, and nearly always painless, both spontaneously and on pressure. They may persist indefinitely, as also they may break down and ulcerate. But then the softening begins in the centre, just against the skin, in such a way as to form a cup-like depression under the pressure of the finger; there remains a peripheral indurated annular margin. But especially there is *no core*.

In syphilis, the nodule is very badly delimited, it becomes painful, cedematous, adherent to the deep parts, and breaks down rapidly in three or four weeks. Finally, here the existence of a *core* is **constant**.

In tuberculosis, the subcutaneous gummata are nearly identical with those of sporotrichosis, and were formerly often mistaken for them. But in tuberculosis it is more a question of infiltration of the skin than of primitive subcutaneous gummatous tumours, which here are rare.

2. **Ulcers**.—*Situation and number*: the same differences as above.

Local characters.—In syphilis, the ulceration is generally broad, perpendicularly cut out at the edge, not loosened, with polycyclic contours (a series of regular arches), the base is sometimes uneven and of the appearance of ham, sometimes yellowish and sloughy on the surface.

In sporotrichosis, on the contrary, it is a question of small fistulæ, often so small as to be imperceptible by the naked eye, and one must press the nodule in order to make a drop of pus or serum flow, to indicate the situation of the orifice. This opening may enlarge later, but it always remains narrow and involves only part of the gumma in the form of a small hole with irregular edges.—Sometimes several small fistulæ are found near together united by cutaneous bands under which one may slide a needle.—They are never confluent as are similar syphilitic lesions. Palpation helps to discover the cup-like softening indicated above.—Finally, there is no core.

If one puncture a syphilitic gumma, the necrosed portion cannot be withdrawn by the syringe; if it is a gumma of sporotrichosis it will be completely emptied.

In syphilis, the lesions at the same stage are contemporary (mostly in the form of ulcerations and cicatrices). In sporotrichosis the gummata are always in different stages; indurated, fluctuating, ulcerated.—Polymorphism exists.

3. **Cicatrices**.

In sporotrichosis, they are small, often only slightly visible, the margins jagged with cutaneous tongues. Here, again, there is polymorphism of lesions, which is a prominent characteristic of sporotrichosis.

4. **Abscesses**.

In sporotrichosis, the abscesses are large (sometimes 300 gr. and more), often scattered about: they are found in the thigh, calf, arm, or thorax.

In tuberculosis, large abscesses have scarcely ever an autonomous existence,

being adjacent to the osteo-articular regions, where they nearly always originate.

To sum up, the clinical diagnosis is very often possible and sometimes even easy; but in many cases the clinical differences between the lesions of sporotrichosis and those of tuberculosis and syphilis are much less sharply defined, as we have indicated, and the diagnosis remains doubtful.—But, at any rate, your attention will at least be awakened in the direction of sporotrichosis, and you will have, in order to dissipate all your doubts, two resources :

II.—Diagnosis by the Test Treatment

You will prescribe from 4 to 8 grammes of iodide daily. If, after two or three weeks, the cure is attained, it is almost sure to be sporotrichosis, for tuberculosis would not be cured thus, or at least so rapidly, and iodide, without mercury, would not be likely to cure syphilitic lesions.

III.—Diagnosis by Culture of the Pus

Culture of the pus affords certainty. But how to make a *culture of the pus*? Reassure yourself. In this particular case all of you may succeed for it is not necessary here to have an installation, nor an incubator, nor a microscope.

It is sufficient to ask, in any laboratory, for three tubes of the prepared nutrient agar-agar of Sabouraud (you can also prepare it yourself in the very simple way described in all the manuals of bacteriology).

You withdraw, with your puncture needle No. 4, a few cubic centigrammes of pus (from one or several fluctuating gummata) and allow a cubic centimetre of the pus to glide down the side of each tube. The tubes must not be capped, nor placed in an incubator; you leave them in a warm room, whenever possible. On the fourth or fifth day, you see that there are developing in the tubes some colonies, which, towards the twelfth day, are quite characteristic.

They have at first the shape of hemispherical white spots of from 5 to 6 millimetres in diameter and are very smooth; but they soon become wrinkled and take on the aspect of cerebral convolutions; from white they become of a chocolate-brown.

If you have no tubes of nutrient agar-agar, or you do not wish to make the culture yourself (which is, however, quite easy), simply collect the pus in a sterilised tube or pipette and send it to a laboratory. The pus preserves its virulence completely for months, and it will help you, if you wish, to make an ulterior diagnosis. In a case where you have no suppurating lesions, but only warty ones, it is necessary to scrape the wart with a bistoury or sterilised forceps, in order to tear away from the wart some strips of skin or scales, which you will deposit with a platinum wire, at separate points, over the surface of the gelatin.

The Iodide Treatment, Internal and External

We have seen that iodine also serves as a means of diagnosis. One prescribes iodide of potassium, or rather the iodides combined, in doses of from 2 to 8 grammes per day, proceeding gradually, being guided by the tolerance of

the patient. Externally, local applications of tincture of iodine. This treatment generally effects a cure in a few weeks.

Local treatment of small or large abscesses of sporotrichosis. **Never open them**, any more than you would cold tuberculous abscesses; but treat them like the last, by puncture, injecting afterwards 5 to 10 drops of tincture of iodine.

The ulcers may be touched with tincture of iodide and dressed with a solution of iodine made thus: water, 500 gr., iodide of potassium, 10 gr., iodine, 1 gr.

This treatment should be pursued for one or two months after the complete clinical cure of the symptoms.

CHAPTER XX

A WORD ON THE TREATMENT OF MULTIPLE TUBERCULOSES

WHEN a patient exhibits two tuberculous foci, the treatment does not call for anything unusual. But it is not so if a greater number of foci exist—for instance 4, 5, 6, 10, 20 foci, distant one from the others.

Such tuberculoses are very frequent.

Thus I have actually more than twenty now under treatment (see figs. 1011, 1012, 1013); among others:—

A boy of twelve years, with double coxitis and three spina ventosa.

A girl of eight years, with three tuberculous glands, Pott's disease, a suppurated coxitis, and a white swelling of the knee.

A little Russian boy with 19 open foci at the elbows, the wrists, the fingers, the knees and the feet.

Another little Russian with 12 open foci of the right cheek, hands and feet, and left leg.

A girl from Corfu with tuberculous peritonitis, a white swelling of the ankle, a spina ventosa, and a double cervical adenitis.

What is one to do in the case of this generalised infection of the organism with tuberculosis?

The treatment may be summed up in two words: it is necessary to make a **maximum of general treatment** and a **minimum of local treatment**.

I will explain.

GENERAL TREATMENT

You place the child at complete rest and in the open air of the seaside or of the country—and you make him live there 2 years, 3 years, 4 years, over-feeding him, watching over his hygiene and preventing all brain work.

LOCAL TREATMENT OF THE TUBERCULOUS FOCI

1st VARIETY: *The foci are closed and have not suppurated.*

You immobilise the affected organs, that is all. You will not introduce modifying injections into the foci.

It is necessary to protect the child even from the very small traumatism caused by repeated pricks and from the slight reaction the injected liquid would cause.

2nd VARIETY: *The foci are closed, but suppurated.*

A.—For the extensive tuberculoses (Pott's disease, coxitis, white swellings) you confine yourself to what is strictly necessary, in order to prevent them opening.

The strict minimum is to make punctures as rarely as possible, and without injections.¹

¹ But you will do, mind you, what is indispensable, that is, everything necessary to prevent the opening, which, in cases of profound tuberculosis, creates too great a danger of secondary infection.

Of two evils, one ought to choose the less. Slight intervention such as punctures, made at great distances from one another, do not present any



Fig. 1011.—Multiple foci, on the frontal bone, the malar bone (open), the cheek (open), the elbow (open), and on the side of the thorax (ready to open).

B.—For suppurated superficial foci.

(a) If they are **few in number**, 2, 3 or 4 only, if it is a question of a cervical adenitis or a subcutaneous cold abscess with the skin intact, you make in the same way, evacuations without injection, and you endeavour to **prevent the opening**.

(b) But if the foci are **very numerous**, for instance 8, 10, 12 or more, as in the children quoted above, if the skin be



Fig. 1012.—One focus on the cheek below the outer canthus, one on the middle finger of the right hand, two on the last two fingers of the left hand, two others on the side of the wrist and above the wrist, four on the left foot (medio-tarsal, 1st and 3rd meta-tarsal, and second toe); lastly, two collections on the left calf. The child has been marvellously cured by a sojourn of two years at Bereh.

menaced: all the more, if it is invaded at several points by tuberculosis, for instance in the case of multiple cutaneous gummata, of spina ventosa involving a great number of digits, in the presence of these foci, which are “too many,” it is best **to do nothing** rather than make each day 10, 15, and more punctures, as would be necessary, in order to have some chance

appreciable danger of bacillary inoculation; on the contrary, the spontaneous opening would afford too many chances here, in these cases of profound tuberculosis, of leading to fatal visceral degenerations.

(without having the certainty) of preventing the opening. In such cases, leave them to open !

To wish to insist here on multiplied punctures and injections which distress the patients, enervate them and lessen their appetites and their sleep, one would incur the **danger** of sowing tuberculosis all over the patient,¹ of **hatching small foci** at



Fig. 1013.—Nineteen foci : right elbow, right thenar region, left hand, left thigh and leg, right ankle.

The cure was complete after ten months at Berck.

¹ With all the greater reason would it be necessary to prevent any surgical operation.

I know very well that I am here in complete disagreement with one great master who finds, on the contrary, in the multiplicity of lesions, all the more reason for operating. He advises multiple and "successive" operations, because (he admits it) these lesions are cured but little or not at all by operation. Well, I reply that **operation is an error and a fault, graver here than elsewhere.** I also have operated on these multiple tubercloses formerly, alas, and I have seen, not only that **operation did not**

every point of the **vulnerable organism**, and, in particular, in the brain.

It is a case (the only one) where a rule given throughout this book for the treatment of suppurated tuberculoses must be relaxed.

The spontaneous opening of these **superficial** tuberculoses,



Fig. 1014.—Apparatus for coxitis and Pott's disease. The opening in front of the groin is for the treatment of an abscess in the hip joint.

I repeat, has no drawback, either as to danger of secondary infection, the drainage being perfectly made, or as to any danger of tuberculous inoculation, seeing that there has been no blood-letting.

This had to be expressed all the more clearly, as it appears

extinguish the focus, but that it **stirred** it up and **set alight** the disease in the lung and the brain. I have several times, in similar cases, observed post-operative generalisation of tuberculosis.

at first sight to be in opposition to the rules we have formulated for the treatment of tuberculosis.

The contradiction is only apparent, as you see after these explanations.

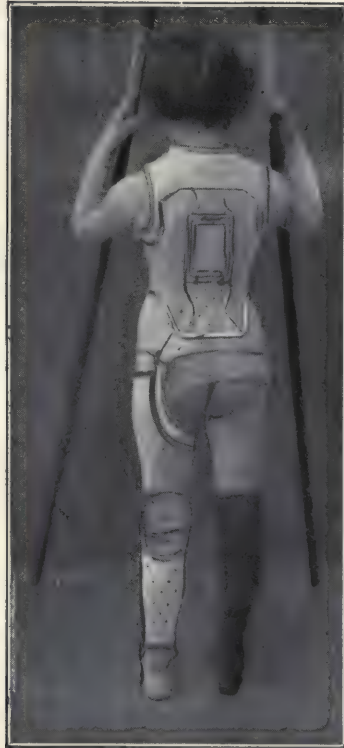


Fig. 1015.—Apparatus for Multiple Tuberculosis.

The Orthopædic Treatment

From the orthopædic point of view, there is no real difference between the treatment of multiple osteo-arthritis and that of single osteo-arthritis.

The apparatus used will be similar in the two cases.

In double hip disease, for instance, one will simply make a plaster including the two thighs.

If there exist at the same time a Pott's disease and a hip disease, you will make a single apparatus reaching from the neck to the knee, or even to the foot. You will arrange for a dorsal opening (fig. 1015) for the compression of the gibbosity, and, if need be, an opening at the hip, in order to inspect the abscess, or any suspected point.

All this is self-evident.

CHAPTER XXI

SYPHILIS OF THE BONES AND ARTICULATIONS

HOW TO DISTINGUISH A SYPHILITIC LESION FROM A TUBERCULOUS LESION

THE physicians at Berck ought to think more about syphilis and the physicians of Saint-Louis more about tuberculosis.

The diagnosis, of capital importance, is often mistaken, perhaps very often.

If the mistake is not very great when one treats as syphilis a tuberculous lesion, think of the consequences the opposite error occasions, when a syphilitic lesion is treated as a tuberculous one.

I might quote the cases of children who have undergone, without success, three or four erosions of bones for osteitis, so called tuberculous, and whom I have cured, in two months, by specific treatment, of the disease considered incurable.

Alas! I know also of two patients who had undergone amputation, one of an arm, the other of a leg, who came to Berck for lesions ticketed tuberculous, similar to those mentioned above (that is, to those intended for amputation), and who were cured by anti-syphilitic treatment alone.

It is evident that these unfortunate ones would not have been mutilated if the surgeon had thought of syphilis!

One does not think of it enough. However, it is not sufficient always to think of it in order to avoid an error, for syphilis and tuberculosis may furnish lesions with an *absolute resemblance* (Gaucher), and the diagnosis is very difficult in certain cases.



Fig. 1015a.—A typical case of hereditary syphilis.

Without wishing to labour the question, I desire to give to practitioners some indications enabling them to avoid these very unfortunate errors.—The indications are drawn entirely from my personal practice.

I will sum them up briefly : three cases may be given.



Fig. 1016.—Heredo-syphilitic child; lesion of the frontal bone; nose depressed; Hutchinsonian teeth.

First Case

A patient comes to you for an osteitis or an osteo-arthritis diagnosed tuberculous.

Nothing in the clinical characters of the **local lesion** attracts the attention to its specificity, **but interrogation** of the parents, or of the patient, reveals to you **antecedents** not to be doubted (hereditary or personal) of syphilis; or

again, it is the general **examination** of the patient, which discloses some **blemishes** or **dystrophies** belonging distinctly to syphilis (acquired or hereditary, figs. 1016 to 1021): teeth dwarfed, notched, and striated, deafness, ocular lesions, the triad of Hutchinson; or again divers exostoses, vault of palate in ogee, nose sunken at base, chronic coryza, etc. In these cases, it is natural to refer the osteo-articular lesion to syphilis and to commence the appropriate treatment—**without affirming anything**, however, for it is necessary not to forget—



Fig. 1017 and 1018.—Hutchinsonian teeth.



Fig. 1019.—Microdontism.



Fig. 1020.—Atrophy of free margin



Fig. 1021.—White furrow.

1st. That a syphilitic subject may have developed a purely tuberculous lesion :

2nd. That there are mixed lesions, *tuberculous syphilides*, which specific treatment may ameliorate but does not cure.

Second Case

Nothing in the **antecedents**, or in **interrogation**, or the general **examination** of the patient¹ draws one's attention to

¹ For one may be heredo-syphilitic and remain exposed to all the eventualities of that dangerous blemish, even though one may not show any dystrophic impress, any congenital sign (Fournier).

syphilis, but it is *the local lesion* which by its very peculiar characters (see fig. 1023 and 1024) ought to make us think of it. Also the lesion does not present itself nor is it developed like an ordinary tuberculosis.

What, then, are the characteristics properly belonging to syphilis ?

Here they are, from my own personal observations.

The lesion is, or is not, suppurated.

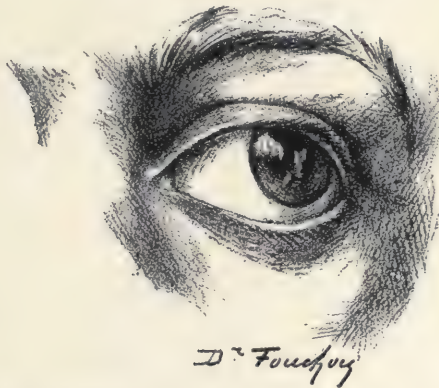


Fig. 1022.—Keratitis in a child presenting other specific lesions.

A.—Non-suppurated Osteitis or Osteo-arthritis

Syphilis generally produces hypertrophy of the bones.

(a) *Hypertrophy en masse*, either of the diaphysis (sabre-edged tibia, ulna spindled, giving the appearance of a spina ventosa), or of the articular extremities (in particular of the knee).

(b) *A localised hyperostosis*.—Exostoses.

A syphilitic knee, with such exostoses, appears truffled or stuffed with peach stones ; sometimes there exist softer foci, by the side of harder ones, separated by folds or interstices,—which give a consistence reminding one of that of lymphadenoma.

It is certain that tuberculosis may sometimes cause an

hyperostosis of the articular extremities. But that is infinitely rare ; so rare that, in the case of hyperostosis, 99 out of 100 times, the cause is not tuberculosis, but something else.

For the distinguishing **feature** (it is a question of syphilis, or of osteo-sarcoma, or of osteo-myelitis ; see p. 969) of the **tuberculous process** is *atrophy of the bone* (see fig. 1031).



Fig. 1023.—Sabre tibiae (with small erosions or cicatrices).

B.—Osteitis or Osteo-arthritis suppurated or fistulous

It has been affirmed that syphilis does not cause supuration of bones or joints. It is a mistake. Syphilitic osseous suppurations are common ; our observations are quite in accord on this point with those of Professor Gaucher.

One very frequently sees syphilitic osteitis ulcerate the skin at one or several points and cause rounded ulcers, their surfaces the colour of ham, and with sharply cut edges.

In two cases, I have seen, before opening, the skin assume a violet or rather coppery tint over a surface as large as a five-franc piece, whilst there appeared small vesicles or phlyctenules resembling a burn or an urticaria. After some days, the skin sloughed *en masse* over this large surface (sometimes it has been detached, like a lid) and there came out, in both cases,

something like a core, a veritable sausage of 4 to 5 cm. in length, of the diameter of the little finger, leaving a fistula leading down to the bone (shaft of femur in one case, iliac fossa in the other). The **core** was formed of a **gummy** material, viscid, amber-coloured, recalling the soft parts of a lymphadenoma.

In certain cases the suppuration from the fistula is kept up by small splinters, which make one think at first sight of a chronic osteo-myelitis (fig. 1025); but the diagnosis is confirmed by the antecedents of syphilis and by the mode of onset of the symptoms, not acute (in the case of syphilis); moreover the necrosis is always more extensive and deeper in osteo-myelitis than in syphilis.

Those are the physical characters of syphilitic lesions.

Here are the *functional signs* :

These are spontaneous **pains**, sometimes very severe, predominating very distinctly **at night**.

The pain is not relieved (or scarcely at all) by rest and by strict immobilisation in a plaster. In fact, nothing will overcome these persistent pains, except specific treatment.

No tenderness (or next to none) on pressure, even when pressure is made over the osseous parts where the patient localises the spontaneous pain.

Other Signs.

There are **hydrarthroses** which disappear and reappear with a disconcerting rapidity, and without apparent cause.



J. S. Fouchay

Fig. 1024.—Hyperostosis of internal condyle of the femur.

The **movements** of the joint are **free** or almost so, even in advanced lesions, and movements communicated to them do not revive the pain, or but very little.

Lastly, **bilaterality** and the **symmetry** of the lesions are frequent, if not the rule.

These are all so many physical or functional signs which do not belong (or scarcely ever) to tuberculosis.



Fig. 1025.—Heredo-syphilitic. Two lesions of bone in the head and face. Keratitis. Suppurated osteitis of the tibia.

When you encounter such symptoms, it will be necessary always for you to think of syphilis, even in default of antecedents and ordinary dystrophies, and having thought of it, commence a specific treatment which will be here again a *veritable test treatment*.

Third Case

You should think of Syphilis also, even when **you fail** to discover the *antecedents* and the local *characters* indicated above, if you have :—

(a) Either *very numerous* osseous and cutaneous lesions,—when, for instance, there exist 5, 10, 15, 20 foci (gummata or ulcers) and when, especially, in that number, one reckons several as *spina ventosa* (fig. 1026). I have said elsewhere (p. 936) that a third of the cases of *spina ventosa* are syphilitic, one-third tuberculous, one-third mixed (that is to say, are tuberculous and syphilitic).

(b) Or lesions, so-called tuberculous, which are *protracted*,

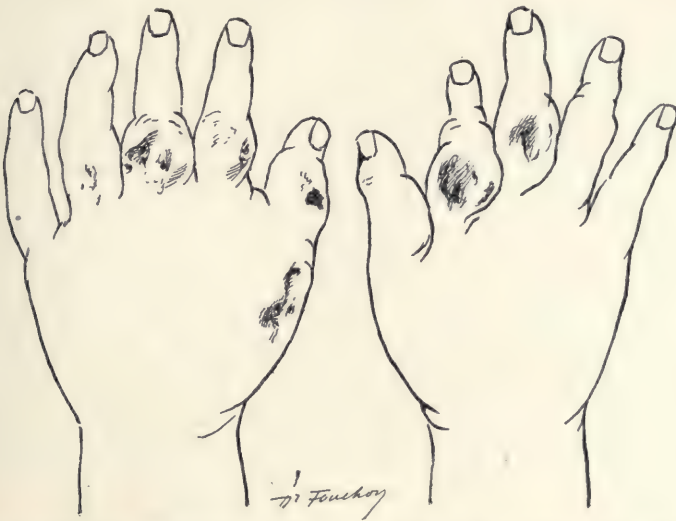


Fig. 1026–1027.—Syphilitic *spina ventosa*, from the child shown in fig. 1016.

which *resist* in an unaccountable fashion a good general and local anti-tuberculous treatment, for example, a sojourn at Berck and the local treatment indicated in this book.

(c) Or suppurated lesions which *open* and become fistulous *in spite of all your efforts* (in spite of rest and compressive dressings, in spite of punctures not followed by injections, etc.).

In all these different cases think of syphilis and adopt specific treatment, which will confirm or disprove the diagnosis. Adopted in these cases it will give you very often, either complete cure

(pure syphilis) or a very notable amelioration (mixed forms, *tuberculosis and syphilis*). This shows you the frequency with which syphilis attacks the bones.

The Specific Treatment

The treatment, what shall it be? *Mercury or potassium iodide?* (Until the specialists have agreed as to the value of and indications for "606.")

M. Gaucher especially recommends mercury, either in the form of injections of biniodide, or through the stomach in the form of lactate (in the same way and in the same doses as perchloride).

Others give the preference to iodide. After experience gained, I like better to combine the two medicaments. But I ought to add that, if I had to choose between the two, I should prefer iodide; because there were a great number of my little patients (and by far the largest number) in whom mercury did nothing, and who afterwards were perfectly cured by iodide. But I combine the two, as I have said,—and for that, in the place of Gibert's syrup, which is not always tolerated, I give the following preparation, which I owe to Professor A. Robin :—

Biniodide of Mercury	0 gr. 20
Iodide of Potassium	20 gr.
Distilled Water	20 gr.
Syrup of Wild Pansy	160 gr.
Simple syrup	200 gr.

Two soup-spoonsful a day (for an adult) in Vichy water.

One may prescribe the following tooth powder, due also to M. Robin :—

Precipitated Carbonate of Lime	80 gr.
Soap	18 gr.
Camphor	2 gr.

Conclusion

When dealing with a lesion said to be tuberculous, whether of a bone or of a joint, think always of syphilis: either to incriminate or to exonerate it.

In all the cases indicated here, and in all those cases which remain ever so little doubtful, that is, in short, *in the major part of the cases of osteitis or of osteo-arthritis diagnosed tuberculous*, do not hesitate to submit the patient for *a few weeks*, to a *specific treatment*.

This treatment will not cause, in itself, **any inconvenience** (Gaucher), and will afford you very often, either a cure (syphilis pure) or a great improvement (tuberculosis and syphilis); the result is attained by 2 or 3 months of treatment.

In cases where it produces no effect, it will not have been altogether useless, since it will have definitely established the diagnosis of the true tuberculous lesion, up to this time doubtful.¹

Why, you will ask, do you not have recourse in cases of doubt ² to the microscopic search for the bacillus in the pus and its inoculation into the guinea-pig ?

1st. Because they are not practical methods for the bulk of practitioners.

2nd. Because the examination of tuberculous pus reveals but rarely the presence of Koch's bacillus, and the inoculation of the guinea-pig, is not always certain ; so that, on the whole, it is more certain, and especially more practicable, to have recourse to the test treatment in order to make a diagnosis.

¹ Osteitis deformans should be syphilitic according to M. Lannelongue ; but M. Robin has demonstrated that the chemical composition of the bone of Osteitis deformans is different from that of syphilitic bones.

² The ophthalmo-reaction, if it is positive, evidently gives us one more presumption in favour of tuberculosis.

CHAPTER XXII

THE TREATMENT OF OSTEO-MYELITIS

WE are going to study in succession the treatment of acute osteo-myelitis¹ and that of chronic osteo-myelitis, which is, nearly always, only an acute osteo-myelitis which has subsided and become protracted.

I.—Acute Osteo-myelitis

A.—Diagnosis

First, a word upon *diagnosis* (figs. 1028 to 1033) not to go over again here the classical picture of acute osteo-myelitis with its origin by marked constitutional disturbance and all the signs of a profound intoxication of the organism (has it not been called *the typhus of the limbs?*) and with, on the contrary, very few local signs, so that one may very easily misconstrue the nature of the symptoms, if one did not as an absolute rule, **in every feverish child, examine the limbs as instinctively as one examines the pharynx or the lungs.**

No, I do not wish to go over again this classical picture, but to tell you, on the contrary, that **the picture is too classical**, and that it does not represent, far from it, all the cases of acute osteo-myelitis, but only the most toxic amongst them, the only ones, it is true, which you have generally had occasion

¹ *Osteo-myelitis* is, as every one knows, inflammation of the bone produced by the staphylococcus and the streptococcus.

See, for its diagnosis from tuberculosis fig. 1030 and 1031 with their descriptions. See, for the diagnosis from osteo-sarcoma, fig. 1032 and 1033 with their descriptions.

to see, as students, in the children's hospital where osteomyelitis is synonymous with urgent operation ; I wish to warn you, in a word, that you will often see, in private

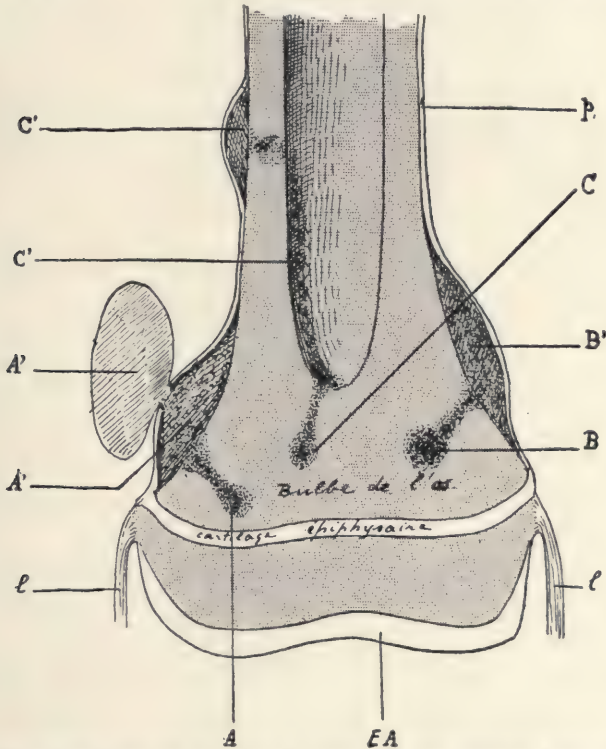


Fig. 1028.—Sketch showing the point of origin and the progress of the infection. The point of origin over the bulb of the bone near the epiphysal cartilage.

Four routes ; either AA' passes under the periosteum, forms an abscess, then bursts through the periosteum and spreads into the soft tissues. Or, BB' remains in the condition of a subperiosteal abscess. Or CC' passes into the medullary canal and then finds its way beneath the periosteum. It is rare, but not impossible, for the focus to traverse the articular cartilage and force its way into the joint cavity.—l. Articular ligaments ; EA, articular cartilage.

practice, cases of osteo-myelitis **much less infectious**, developing in the same way as a phlegmon of the soft tissues, from which you will know how to differentiate them, because in osteo-myelitis, the swelling starts from the bone and pressure

upon it, very near its extremity (fig. 1028)—that is to say, opposite to the junction of the diaphysis and the articular cartilage—is particularly painful.

This distinction between the two forms of osteo-myelitis is

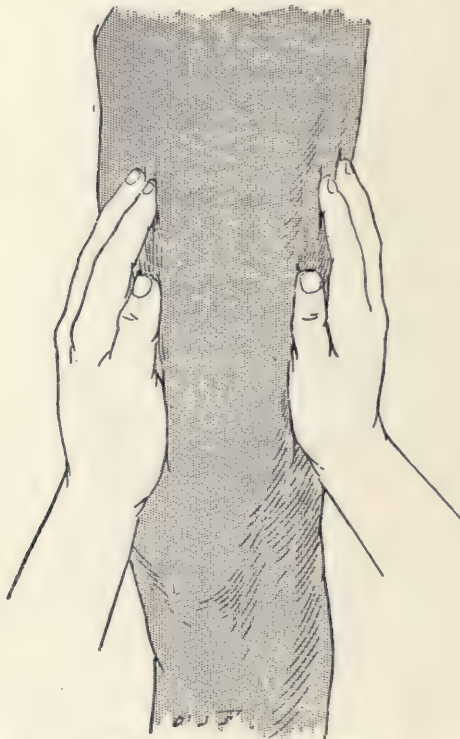


Fig. 1029.—Acute osteo-myelitis of the thigh; to find the pus, palpate with the hands flat on the two opposite sides of the limb: wide palpation, on the surface. If the two hands are not disposed in this way, one will not feel the fluctuation; the pus spreading over to the other surface may escape the search.

of the first importance, for the treatment differs a great deal in the two cases.

B.—The Treatment

1st form.—**Osteo-myelitis of medium gravity.**—The disease shows itself here, and goes on developing as, a **local**

affection. The temperature remains above 103° . There is no albumen in the urine. The general condition is serious, but there is nothing to cause anxiety, at least for the present.

On the other hand, the signs of inflammation of the bone

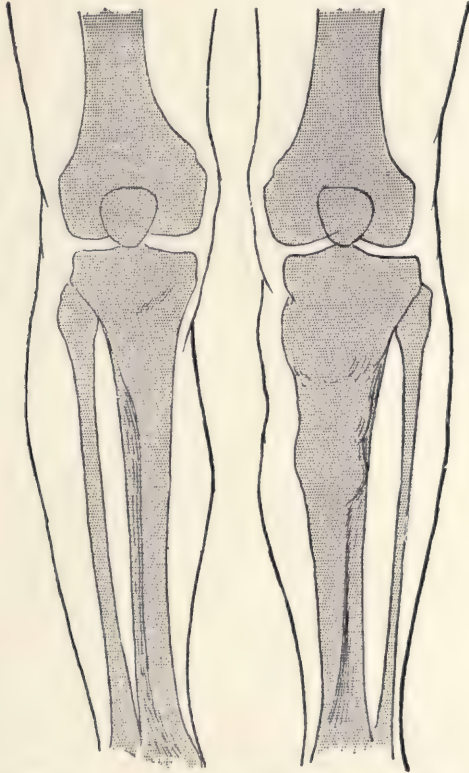


Fig. 1030.—Osteo-myelitis of the left tibia (from a radiograph). The bone is hypertrophied and irregularly bossed; the swelling is not limited so markedly as in osteo-sarcoma. The right tibia is normal.

are very distinct: there is painful puffiness over the femur, or the tibia, or the humerus (according to the case), situated over the diaphysis, but very near to the extremity of the bone (fig. 1028).

Proceed here as if you were in the presence of a phlegmon.

When the local signs are distinct and well localised, you incise the soft tissues (but **without trephining** the bone).

(a) (Fig. 1028, A). If *fluctuation* is *very distinct* and sub-

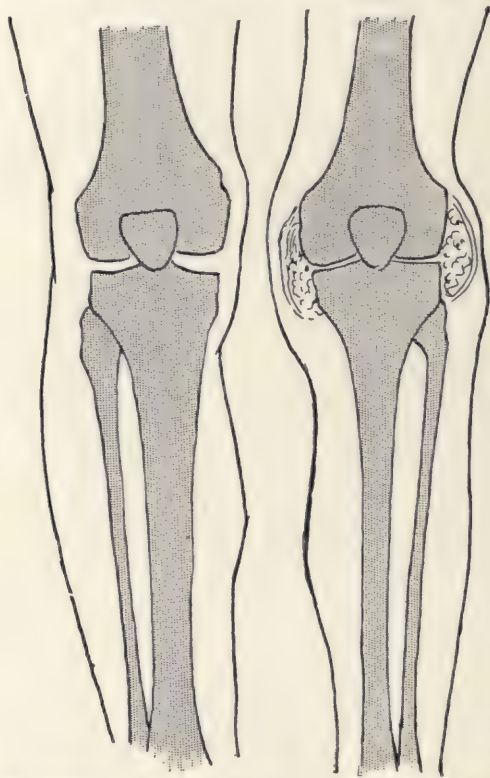


Fig. 1031.—White swelling of the knee (after a radiograph). Atrophy of the bones on the affected side; increase in volume of the knee, proceeding from the distension of the synovial cavity by pulpy masses.—Compare with fig. 1030. Other elements of diagnosis with osteo-myelitis: tuberculosis generally involves the articular extremities; osteo-myelitis nearly always the diaphysis. The onset is insidious in tuberculosis, acute in osteo-myelitis, etc.

cutaneous, you will attack the collection by incising it, for 3 or 4 cm., you will drain it well, and that is all.

(b) (Fig. 1028, B). *No fluctuation is appreciable* in the soft tissues, but there is a very distinct **bogginess of the deep**

parts, forming a **casing** round the bone, with one small point particularly resilient.

You will proceed, with your bistoury, to attack this point

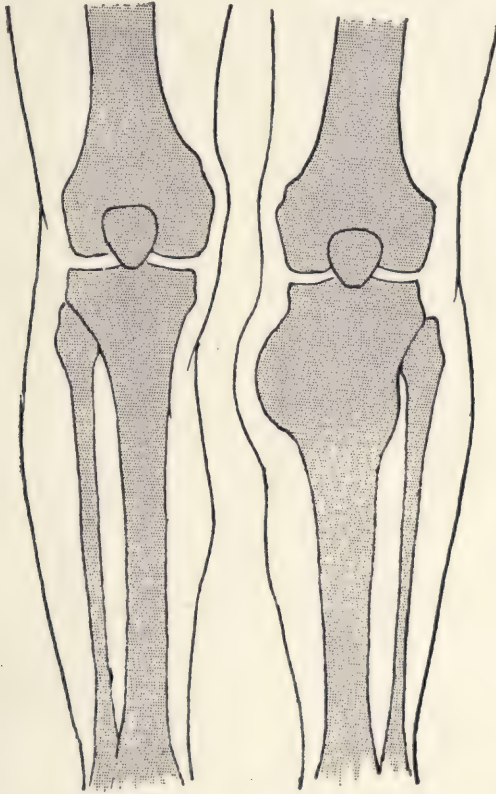


Fig. 1032.—Osteo-sarcoma of the tibia (from a radiograph). Diagnosis from osteomyelitis. In osteo-sarcoma the bone is like a club, it is fusiform in osteomyelitis (see fig. 1030). In osteo-sarcoma the onset is insidious, there is scarcely ever fever, development less rapid.

by passing between the muscles or between two muscle fasciæ, and you will keep on until you have found pus.

You make an incision of from 3 to 4 cm. in length in the resilient mass and introduce a large drain.

If you do not find pus outside the periosteum, you open it

up by a cross-shaped incision of 3 cm. in each direction, and you will drain the part thoroughly (fig. 1034).

That is what you will do, but this is **what you will not do**. You will guard against all immediate trephining, in spite of your having probably heard set forth the necessity for trephining

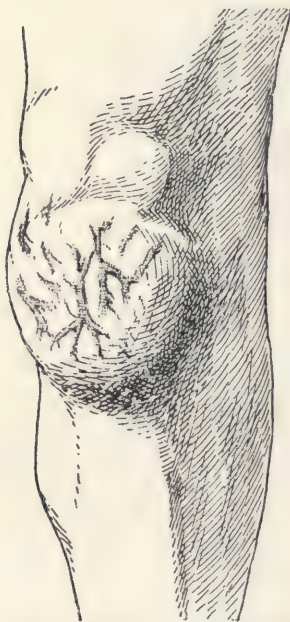


Fig. 1033.—Again an osteo-sarcoma of the tibia; tumour very easily delimitable, in a large mass, a venous network "like the head of Medusa" over the surface of the tumour. Situation epiphysial rather than diaphysial; the onset and development are different, etc.

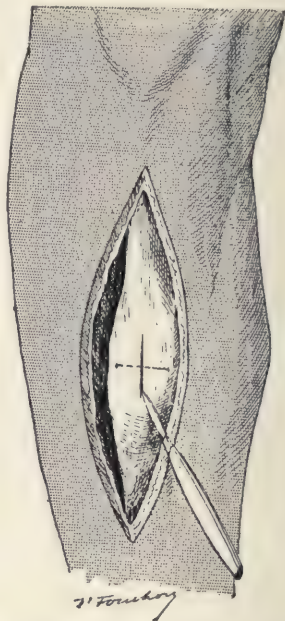


Fig. 1034.—Osteo-myelitis. After incision of the soft tissues, one comes upon the periosteum raised by the pus (see fig. 1028); crucial incision of periosteum. After which raise its edges and drain.

in all cases. Well, no, this is not necessary here, and besides, it is not harmless.

1st. *Trephining is not always necessary.*

I have cured a very large number of cases of osteo-myelitis

by incision only of the soft tissues and the periosteum, *without trephining the bone*

2nd. *It is not harmless.*

For the hole, or holes, made in sound bone are filled up with great difficulty and may cause obstinate fistulæ which are liable to be infected ; and the risk is much greater here, where the vitality of the bone is compromised by the disease.

The danger is further increased by the wide detachment of the periosteum and the scraping of the medullary canal which many surgeons do at the onset, *as a matter of routine*, in all cases of osteo-myelitis without exception. For all these reasons, I consider that, by immediate and very wide trephining of the bone, one encourages ulterior necrosis.

Therefore, in these cases, do not trephine at the outset. But it goes without saying that you will be on the watch. If, two or three days after the incision into the soft parts, the temperature has not fallen, and if the persistence of the fever cannot be attributed to a new focus which has appeared elsewhere, but rather to a retention of pus in the medullary canal—then, yes, you will trephine the bone,—but that will happen certainly not once in five times in osteo-myelitis of the first form, that is, more than four times out of five you will be able to produce evidence that you have saved these patients from fistulæ in the bones, which are always serious and very often interminable.

2nd form.—**Acute infective osteo-myelitis.** Here we have a general intoxication of the organism : temperature 104°, prostration, insomnia, low delirium, urine scanty and containing albumen.

In such a case, the vital indication over-rides everything. The danger is pressing, it is necessary to neglect nothing which will lessen it—and to proceed without delay. The stage of development of the local conditions matters little, **you will intervene as a matter of urgency**, immediately ; as soon

as you know where the bone is affected, you proceed at once to open the medullary canal.

One incises the periosteum in the crucial manner by two incisions of 4 cm. each; one raises the flaps and one tre-

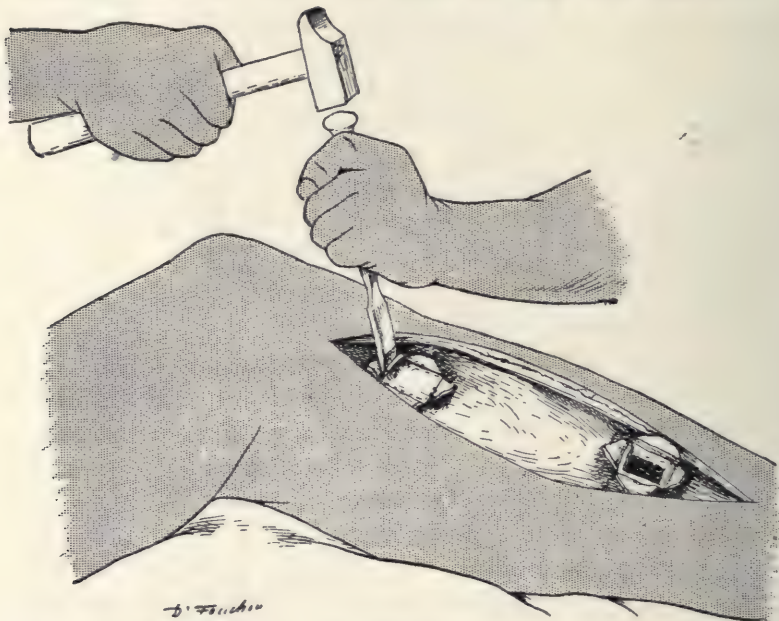


Fig. 1035.—Trephining at the two extremities of the diseased focus; the periosteum has been incised and raised previously, at the two places only where one uses the chisel; the part lying between the two openings is not detached. In order to do this, put on the Esmarch's bandage beforehand; it facilitates the work and has no inconvenience notwithstanding what has been said to the contrary.

phines; in order to open a safety valve, make an opening one and a half centimetres in diameter.

That is done in this way: with a chisel and mallet one marks out a square of bone of the above dimensions and opens the medullary canal (fig. 1035).

Do not curette the marrow, for, under the pretext of removing all infected particles, this would cause bleeding, or set up inoculation, or compromise the nutrition of the bone.

There is a flow of dark blood streaked with pus from the opening made in the bone. If the flow does not seem to be sufficient with one opening, do not hesitate to **make a second** at 8 centimetres above or below ; between the two, over the bridge of bone which separates them, one preserves the periosteum, one takes care not to denude it, contrary to what is done

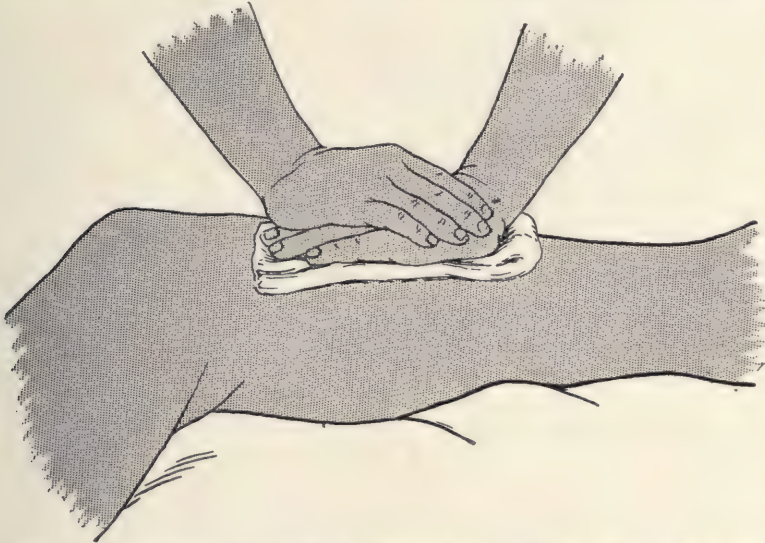


Fig. 1036.—Arrest of hæmorrhage on removal of the Esmarch bandage, the two hands making pressure over the whole extent of the wound. The compression should be kept up for ten minutes. After that, mop the part with a swab of sterilised gauze. Suture the skin partially and apply a light compressive dressing with two Velpeau bandages.

by some surgeons ; though it is true that the periosteum often becomes detached of itself in such cases.

With a small aseptic syringe, pass a stream of sterilised water or a warm solution of sublimate from one opening to the other, to make sure that the track is permeable ; place in it two small drains, and that is all (fig. 1036).¹

Do not Resect the Shaft immediately.—If I tell you

¹ If there is pus in the joint (which is rare) one drains the joint thoroughly (see Drainage of Joints, Chap. VII.).

this, it is because some do not fear to do so under the pretext that the bone may become necrosed afterwards, but that is wrong, because :

1st. One cannot be certain, even in the most unpromising cases, that the bone *will* become necrosed.¹

2nd. One cannot, by local examination,² distinguish



Fig. 1037.—Chronic fistulous myelitis of the tibia. The bone is uneven, bossed, hypertrophied over a large extent ; fistulae and adherent cicatrices. Diagnosis from tuberculosis : 1st by the mode of origin of acute symptoms in osteomyelitis ; 2nd by its seat, being rather diaphysial ; 3rd by hypertrophy of the bone in osteomyelitis and its atrophy in tuberculosis.

¹ Even were one sure that this fragment (comprising the whole thickness of the bone) were going to necrose, it would not be necessary to remove it immediately, for it will serve, for some weeks, as a direct support for the new bone which is in formation (see fig. 1040).

² There are only probabilities more or less great from this point of view, If the denuded plate of bone does not cut with the colour of the neighbouring

certainly, in a moment, bone which is going to die ; and one would be acting blindly, in saving perhaps that which is doomed to necrosis, and removing that which may live.

Therefore, for the time being, simply trephine.

If cicatrisation does not occur for a few months afterwards, we encounter the condition of chronic osteo-myelitis, of which we will now speak.

The Treatment of Chronic Osteo-myelitis

This is often seen with one or several fistulæ (see fig. 1037 and p. 984 for the diagnosis).

A fistula existing for several months is an almost certain

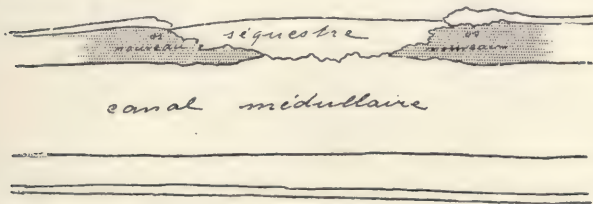


Fig. 1038.—Sequestrum formed like a "segment of a ferrule." One sees the hypertrophied periosteum producing new, living bone.

proof of the existence of a sequestrum. One ought to set about finding it, but it is necessary **to wait 5 months** after the preceding operation, because **dead bone takes about 5 months to separate** from living bone.

One traces the cutaneous fistula down to the hole in the bone.

One distinguishes then, very easily, the dead bone from the new and living bone, which is rough, irregular, exuberant, reddish,

bone, if the plate remains of a rosy white and preserves (by small vascular tufts) its attachment to the periosteum, it is very probable that it will live ; if, on the contrary, the osseous plate is dullish white or *greenish white*, cutting with the colour of the neighbouring bone ; if it is entirely separated from the periosteum over a large extent, without preserving the least attachment with it, it is very probable that it will necrose.

dotted with bloody points, whilst the dead bone is very smooth, of a dull white or yellowish colour, recalling the appearance of old ivory (see fig. 1038 and following).

1st. *Sometimes the sequestrum is on the surface of the new*



Fig. 1039.—The gouge is pushed under the sequestrum at its angle and one tries to loosen it by leverage.

bone, and it will come away alone, or one can easily remove it (fig. 1039).

2nd. *Sometimes a sequestrum occurs in the medullary canal*

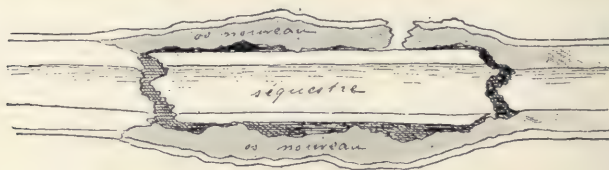


Fig. 1040.—Sequestrum of the diaphysis in the form of a ferrule, entirely encased. The sequestrum has served as a support for the new bone, during its development.

(see fig. 1040, 1041 and 1042); it points through the opening, one sees it, or it is easy, with a forceps introduced into the canal, to find it; if it is awkward to seize hold of, one enlarges the orifice with the chisel and a few taps of the mallet.

3rd. *Sometimes it is encased in the new bone like ore in the flinty veinstone (fig. 1043).*

In the third case, one is obliged to divide one or several small

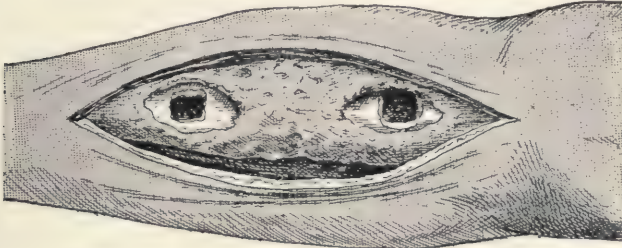


Fig. 1041.—Long-standing osteo-myelitis; 5 months after the first operation, one again opened up the wound; one found the old bone, necrosed, white, and smooth, showing still the two trephine holes, and sheathed in new and living bone; the latter is irregular in shape, reddish, rugose, exuberant. The periosteum is not detached in the space between the trephine holes.

bridges in order to disengage the sequestrum; but do not try to remove it unless it is distinctly detached from the living bone, or at least, unless the separation is already begun. If it is not, do



Fig. 1042.—One loosens, and withdraws with the forceps the fragments of sequestrum (after having, if need be, enlarged the openings already existing).

not persist, drain the wound and wait a few months until spontaneous separation becomes an accomplished fact or nearly so.

In the absence of a sequestrum, take care that you do not remove the periosteum very extensively from the almost entire

diaphysis, by creating deep cavities and curetting them *within and without*.¹

Limit yourself to draining the suppurated focus, but drain sufficiently to assure the temperature of the patient keeping normal; if not successful, look out for renal infections, albuminuria, and irremediable secondary visceral degenerations.

In some particular case, it may be that you have not happened to find a sequestrum distinctly formed and *detached*: there is, in fact, no sequestrum, and the bone is *diseased "en masse"* and uniformly at all points.

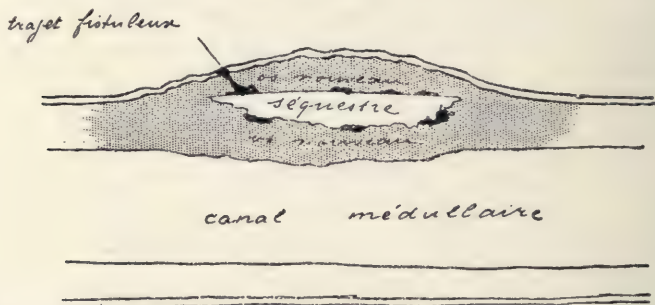


Fig. 1043.—Sequestrum encased in an expanded part of the new bone which is living and ought to be resected only sufficiently to allow of removal of the sequestrum.

In that case there is nothing to be done; one must wait.

Alas! it will be necessary sometimes to wait a long time, three years, five years, eight years, for a cure of these very bad cases of osteo-mylitis which thus go on indefinitely.

One must accept the situation and learn to hold one's hand.

¹ Exceptionally, **in the absence of any fistula**, the indication for operation in **chronic osteo-mylitis** may be a **very acute pain** producing disability, a pain which persists in spite of rest. In that case, one trephines the area of bone where the maximum of pain is situated; there is nearly always hypertrophy and expansion of the bone tissue at this point.

One trephines at this point to discover if a sequestrum (fig. 1044) or, may be, an abscess exists there.

Occasionally one observes at the same time, in the absence of both sequestrum and abscess, that the removal of bone by trephining has cured the patient of his acute pains.

For the cavities made in all directions and the lateral resections of the diaphysis, which some surgeons make in these cases where they have not found a sequestrum, without doubt for fear of appearing nonplussed, all that, I say, would not ensure the life of the bone, the vessels of which are strangled by the osseous proliferation which has occurred in the Haversian canals.

It is necessary, then, to abstain and leave these patients to live with their fistulæ when they are not too miserable. Do not forget that the fistulæ may nevertheless close spontaneously, even after five, ten, fifteen years, when one dares no longer hope.

It may, however, happen, under exceptional circumstances, that the suppuration is so abundant and the pain so distressing, that the patient himself demands amputation, which remains, in fact, the only remedy.

Résumé and Conclusion .

A.—*Acute Osteo-myelitis*

1st. Ordinary form.—Temperature is below 103° : one must not trephine at once, but cut down on the bone and incise the periosteum.

2nd. Infective form.—When the fever oscillates around 104° , one trephines the bone at once, but without resecting the diaphysis, because one cannot, at this moment, distinguish whether the bone is doomed to necrose, or is likely to live.

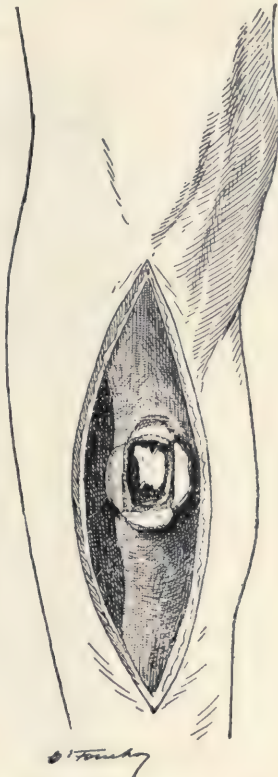


Fig. 1044.—The periosteum is incised and turned aside over the "expanded" bone or at the seat of the maximum pain; the new bone is chipped away with the gouge, and you finish by exposing the sequestrum—or an abscess.

B.—*Chronic Fistulous Osteo-myelitis*

The treatment consists in looking, every five months, to see if there is a sequestrum which can be removed (fig. 1035).



Fig. 1045.—David B., Rothschild Hospital; multiple fistulae in the arm and complete necrosis of the humerus, the ulna and the radius, after particularly severe osteo-myelitis.—I performed ablation of the three necrosed bones (from the shoulder to the wrist) that is, **entirely deossified the arm and forearm**. The operation took place six months after the onset of the acute symptoms. Four months after the operation, a **new humerus had been formed**, obviously of the same length as the normal humerus, but the periosteum of the forearm has reproduced only a short osteo-fibrous and slightly solid twig. Nevertheless, such as it is, the arm fulfils almost the normal functions.—One sees the site of the new articulation of the elbow, which has only, it is true, a play of from 15 to 20 degrees.

If one does not find a sequestrum, there is nothing to be done but still to wait, meanwhile draining and preventing sepsis.

CHAPTER XXIII

THE DIAGNOSIS OF CHRONIC OSTEITIS AND CHRONIC ARTHRITIS

A.—*DIAGNOSIS OF A CHRONIC OSTEITIS*

I.—*Non-suppurated Osteitis*

a. Is the origin *traumatic*?

Patients will often speak to you of an accident (a fall or a blow).

Do not be content with such history if the osteitis has continued for several weeks,—if, in spite of the date assigned to the traumatism, the lesion remains stationary, but especially if it progresses.

This chronic inflammation of the bone will be either :—

b. *Tuberculous*, very often, 9 times out of 10 (see fig. 1046) ;

c. *Syphilitic*, once in ten times (fig. 1050) ;

d. An *Osteo-sarcoma*, very rarely, perhaps once in a hundred times¹ (fig. 1048).

The diagnosis of **syphilis** and of **tuberculosis** has been discussed in Chap. XXI., to which I refer you.

The diagnosis of **osteosarcoma** is generally very easy with radiography (see fig. 1048).—In default of the X-rays, be guided

¹ *Osteomyelitis* (fig. 1047) may give rise to chronic osteitis which is not at present suppurating, but which has been, and one finds traces of this old suppuration. There is also the history : acute onset, etc. (see the preceding chapter and fig. 1047).

Wishing to remain practical, I do not speak of those other processes capable of causing chronic osteites, because you will very probably never see them, for instance : osteomyelitis chronic from the beginning, hydatid cysts of bone, etc.

by the relatively rapid increase in volume of the bone,—which may be doubled in size in 3, 4, 5 months.—One has sometimes the sensation of peri-osseous masses, fungating, and causing a **false fluctuation**. One often believes even that there is a collection of fluid, and there is no objection, in making sure of this, to an exploratory puncture, when only blood will be found if the case be sarcoma. The swelling may be vascular

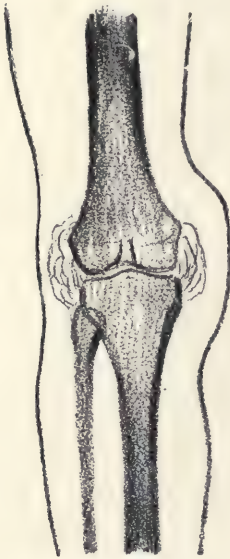


Fig. 1046.—*Tuberculosis* : atrophy of bone.



Fig. 1047.—*Osteo-myelitis* : enlargement club-like and hard.



Fig. 1048.—*Osteo-sarcoma* : enlarged in club form and rarefied.

to such an extent that it conveys pulsations which have led to its being mistaken for aneurism.—At other times, one may feel on palpation, a parchment-like crepitus as if one were breaking small fragments of bones.¹

¹ How to distinguish a **syphilitic** sabre-shaped **tibia** from a **rachitic** tibia or one affected with **osteomyelitis**? One is helped by the history, by the antecedents—and a general examination of the patient. Further:

a. In *syphilis*: there is the shape of the bone, which is enlarged but not

II.—Suppurated Osteitis and Fistulous Osteitis

a. If it is a question of *chronic suppurated osteitis*, but *unopened* (that is, if there is a cold abscess) it is due to *tuberculosis* in 9 cases out of 10, or to *syphilis* in one case out of 10 (see Chap. XXI., for the diagnosis between the two).

b. If there are *one* or **several fistulæ** it may be, it is true, tuberculosis or syphilis,—but it may also be an *osteomyelitis*, in which case one has the antecedents, the history of an acute or very acute onset; the bone is hypertrophied “*en masse*,” enlarged and hardened (see fig. 1047); from time to time small splinters of bone are discharged through the fistulous openings.

B.—DIAGNOSIS OF CHRONIC ARTHRITIS

I.—Suppurated and Fistulous Arthritis

(*a*) **Arthritis with formation of pus but not opened.**—It is nearly always *tuberculous*, but sometimes *syphilitic*.

(*b*) **Fistulous Arthritis.**—This will generally be tuberculosis—rarely syphilis or osteo-myelitis.

The elements of diagnosis are here the same as in chronic osteitis (see above).

twisted (fig. 1050); in Rachitis under the X-rays one sees the medullary canal preserved, whilst it is filled up in osteo-myelitis.

b. As to *Rachitis*: the *twisting of the bone* and the thickening of its extremities; in some cases the diaphyses are bent, etc. (fig. 1049).

c. As to *osteo-myelitis*: the hypertrophy of the bone is very irregular (see fig. 1047), there are traces of old suppuration, cicatrices adherent to the bone, etc.

A propos of Rachitis and Syphilis, we may remark that, according to Marfan, syphilis in the parents may produce of itself—exceptionally—true rachitic lesions; for instance, in children nursed at the breast under the best hygienic conditions. In that case, the rachitis is earlier in appearing (in the third or fourth month) when it is due, as it generally is, to digestive troubles. Further, the natiform cranium is especially the sign of hereditary syphilitic rachitis. Lastly, one has, on the one hand, the syphilitic antecedents of the parents, on the other the absence of causes of the digestive order present in ordinary rachitis.

II.—Arthritis not Suppurated

Patients may recall, here again, either *traumatism* or *rheumatism*. If the **traumatism** has been very slight or next to



Fig. 1049.—*Rachitis* : **twisting** and **nodosity** of the epiphyses.



Fig. 1050.—*Syphilis* : **expansion**.

nothing, or if it dates back several weeks—and if the symptoms persist or increase, in spite of massage, think of some other cause than traumatism.

Rheumatism.—In the same way be suspicious, above everything, of those **monarticular rheumatisms which continue** for months, in spite of appropriate treatment, salicylate of soda, etc., etc. It is not rheumatism; look for something else.

In the same way be suspicious of **hydrarthroses** which go on indefinitely.

It is a question in these cases of : *a. Tuberculosis*, generally ;

(*b. Syphilis*, sometimes ;

(*c*) Think also of *osteo-sarcoma*, though it is very rare ;

(*d*) As to an *osteo-myelitis*?—Yes, this may produce arthrites which are no longer suppurating though they have been suppurated at some time. The diagnosis is by means of the history, the cicatrices, etc.¹

The elements of these different diagnoses are the same here as for the chronic osteites (see above, p. 983).

(*e*) Think of *Polyarthritis deformans*. The diagnosis is made from the multiplicity of the joints affected, the enlargement of the small joints, the slow onset, the sub-acute outgrowths always painful, rarely accompanied by fever (Robin).

(*f*) As to *blenorragia*.—In the adult, always think of this. But the onset has been acute, and interrogation and examination of the discharge reveals the existence of the gonococcus.

(*g*) As to *tabes*.—In this case, there is a dislocation or a crumbling away of the extremities of the bones, sometimes transformed into a “**bag of nuts**”; the joints themselves are more or less flail-like and sometimes luxated. **Absence of pain** is almost absolute, even in very advanced cases. This is distinctive. Further, positive signs of ataxy may be revealed by a general examination.

(*h*) *Dry arthritis* is recognised by crackling in the joints ;—the patient suffers less in walking than when at rest, etc.—General examination of the patient.

¹ Further, in the case of osteo-myelitis, the whole region, because of the *sclerosis of the soft tissues*, has a hardness equal to that of wood.

(i) In *varicose conditions*.—Notice the chronic arthrites (swelling, hydrarthroses, etc.), which one finds very often among these patients, without any other cause than the troubles in the circulation caused by the varices. Treat these, and the articular phenomena will disappear.

(j) Arthrites consequent on *eruptive fevers*, especially *scarlet fever*. The diagnosis is by the history, etc.

Do not forget that the eruptive fevers, and **especially** measles, open the door to tuberculosis, and very often leave behind **true tuberculous arthritis**.

CHAPTER XXIV

SOME DEFORMITIES OF THE HAND AND FINGERS

1ST. CONTRACTION OF THE PALMAR APONEUROSIS (or Dupuytren's disease : fig. 1051 and 1052)

Treatment.—To produce a permanent result, it is necessary to operate upon, not only the palmar aponeurosis (excising it),



Fig. 1051.—Contraction of the palmar aponeurosis (secondary contraction of the flexors of the little and ring fingers).

but also upon the contracted flexor tendons (elongating them), in spite of the fact that the tendinous contraction may be secondary.

1st Step.—**Incision of the skin.** A V-shaped incision is made with the apex upwards, including the retracted skin (fig. 1053).

2nd Stage.—One **dissects off** the flap from the aponeurosis, to which it is closely adherent, separating it very minutely

and very slowly, by slight cuts of the bistoury or of the scissors.

3rd Step.—One **surrounds** by incisions "*en trapèze*" the contracted and sclerosed **segment** of the **aponeurosis**, *proceeding with caution*, so as not to injure the vascular and nervous branches lying beneath.

The area of aponeurosis thus delimited is *excised*, by dividing the fibrous expansions, which are spread over the sheaths of the tendons.

4th Step.—**Lengthening the tendons** (fig. 1054).—One lengthens the two flexor tendons (superficial and deep) of the finger or fingers which are contracted, by hemisection.



Fig. 1052.—Contraction of the palmar aponeurosis: impossibility of performing extension of the fingers.

Follow the procedure described for lengthening the tendo Achillis (see Chap. XIII.).

One then attacks the tendons in the middle of the hand, above the point where the superficial tendon divides into two bands—commencing with hemisection of the deep flexor.

The difference in level of the two transverse hemisections is calculated according to the degree of flexion of the fingers. This calculation is made on the same basis as for the tendo Achillis (see Chap. XIII.).

The fingers are carried into extension, or even

hyper-extension, the skin is sutured with catgut in the manner represented in fig. 1055 and the correction is maintained by a plaster which is left in position for three weeks.

It is necessary to closely watch the circulation and the innervation of the fingers : to do that, one uncovers the pulp of the fingers and make certain, morning and evening, that the patient can feel the prick of a needle.

In order to facilitate this in-



Fig. 1053.—One has already incised the skin, in V-shape, and excised the contracted aponeurosis. The fingers are noticeably elongated, widening the margins of the wound. In dotted lines is the superficial palmar arch.

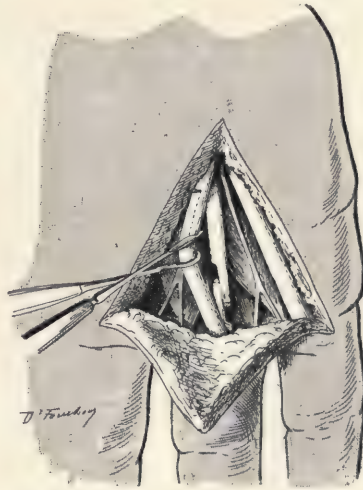


Fig. 1054.—The tendons are exposed ; the perforating or deep tendon has been lengthened, after having turned aside the perforated or superficial tendon ; the latter is lengthened in its turn by an identical proceeding.

spection, and to *prevent all risk of sloughing of the fingers* at the points pressed upon, it is wise to exchange the immovable plaster for one bivalve (fig. 1056).

The bivalve is prepared the day after the operation.

It becomes very easy to control (every day or every second day) the condition of the fingers : on each occasion one pads, if

necessary, the plaster, opposite any suspected points—after which the two valves ¹ are again placed in position.

After the three weeks required for the cicatrisation of the tissues, manipulations and active and passive exercises are commenced, to render the hand and fingers supple.

In the interval of the exercises, the hand is replaced, if necessary, in the bivalve plaster.

2ND. CONTRACTION OF THE FINGERS

I have observed several times, in young girls, this *essential* contraction, that is, contraction of the fingers without appreciable co-existing contraction of the skin or of the palmar aponeurosis.

(a) *The mild and recent case*: the hand is massaged, malaxed, redressed once or twice a day, and after each manipulation is supported by two wooden splints (padded with wool) one dorsal, the other palmar (fig. 1058).

(b) *Long-standing and severe cases*: the superficial and deep flexor tendons will be lengthened, by hemisection after the



Fig. 1055.—Suture of the skin, altering the V into Y.

¹ Recall what we have said *à propos* of plasters for club foot, namely, that one may avoid sloughs by being careful not to add anything to the correction, once the plaster bandage has been applied.

The plaster ought to do nothing else but preserve the correction previously obtained by surgical operation or orthopædic manœuvres, that is, one should not expect it to be a supplement to correction.

manner described above, and supported afterwards as explained.



Fig. 1056.—Bivalve plaster seen on the radial surface, one palmar valve, one dorsal, which are kept together afterwards with a soft bandage.

If you find the first of these treatments too troublesome and

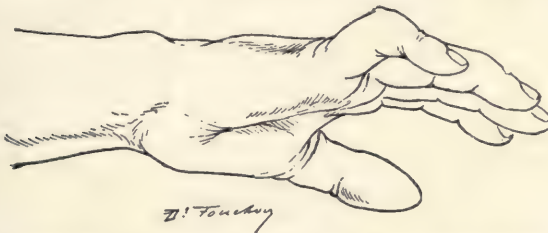


Fig. 1057.—“Essential” contraction of the flexor tendons of the fingers; the first phalanx is in hyper-extension, the other two flexed.

of little practical use to you, and if the second does not appear

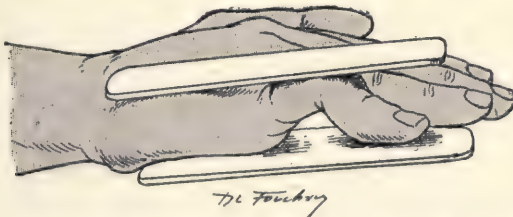


Fig. 1058.—Two wooden splints (padded with wool) are placed on the dorsal and palmar aspects of the fifth finger; they reach up to the carpus; and are supported by a bandage. Look at it twice a day in order to avoid sloughing.

to you likely to be approved of because it requires a surgical operation, you may make a forcible straightening of the deviation

by simple orthopædic manœuvres in several stages, being guided by what we have said on the straightening of club foot (Chap. XV.).

The forcible straightening may be effected either *without chloroform*, in 7 or 8 sittings, at the rate of one per week, each sitting being very gentle and kept up for ten or fifteen minutes, and followed by the application of a plaster.

The correction is obtained in this way in two or three months.

Or, *under chloroform* in two sittings, by vigorous manœuvres



Fig. 1059.—“Symptomatic” contraction involving the middle finger; the sheath of the flexor tendon is swollen, bulging into the palm of the hand; the first phalanx is very much increased in volume on the palmar surface.

—It is caused by *pulpy synovitis with rice-shaped grains* (see p. 934).

of brassage continued for a quarter of an hour: the second sitting from 15 to 20 days after the first, ensures the correction (or rather the hyper-correction) in about six weeks.

In both cases, the after-treatment by massage, exercises, and retention in a bivalve plaster ought to be prolonged for months, at least six, without which one runs the risk of seeing the deformity reproduced.

What I have said refers entirely to the “*essential*” contraction of the fingers, often hereditary or running in the family, but it should not be applied to “*symptomatic*” retraction of tendons in tuberculosis of the synovial sheaths (fig. 1059)

The diagnosis of symptomatic contraction is made by the age of the patients being generally less advanced, by the antecedents of tuberculosis, by the fact that the tendons are *thickened* and *globular* instead of being distinctly detached in delicate cords as in essential contraction; the thickening may in places form pseudo-fluctuating masses, of the size of a nut, whilst that sometimes observed in essential contraction is as small in volume as a lentil and of the consistence of a wart. An exploratory puncture made in these swellings evacuates, in the case of symptomatic contractions, a serous liquid with or without rice-shaped grains.

The diagnosis is important, for one must not incise in such a case, but puncture and inject; one does not attend to the redressment until after one has cured the tuberculosis, whilst in essential contraction, one may lay it open at once in order to perform hemisection of the tendons.

CHAPTER XXV

SOME DEFORMITIES OF THE FOOT AND THE TOES

1ST. PES CAVUS

SHOULD you have to treat a deformity or deviation of the foot, it will be sufficient to remember what we have said in Chaps. XIII. and XV., upon the treatment of the deviations of infantile paralysis and congenital club foot.

Let us take, for example, *Talipes equinus*, because here as in **talipes calcaneus** there exists, as you know, a **pes cavus** often complicated with **varus**.

In these two varieties of club foot, it is a question (much more often than of congenital malformations) of acquired deviations, consecutive to limited infantile paralyses.

Their **treatment** presents one common indication, namely, to stretch the plantar aponeurosis, which is contracted in both cases.

The course to take with regard to the *tendo Achillis* differs altogether, seeing that in *talipes calcaneus* one ought to shorten the tendon, and, on the contrary, lengthen it in *talipes equinus*.

Lastly, when the great toe is pulled upwards, which is frequently the case, one ought to lengthen also the proper extensor of the toe.

How are we to fulfil these different indications where *talipes equinus* is concerned ?

One can do it in one of two ways : either by simple orthopædic manœuvres—or by section of the tendons or aponeuroses.

The better way is to combine the two methods : one obtains in that way the most perfect and lasting result.

This will explain :



Fig. 1060.—Talipes equinus.—3 factors of deviation : contraction of the tendo Achillis, contraction of the plantar aponeurosis, and contraction of the extensor proprius hallucis.

Cast your eyes on figs. 1060 and 1061 ; they show you that the deformity of talipes equinus is made up of three principal elements :

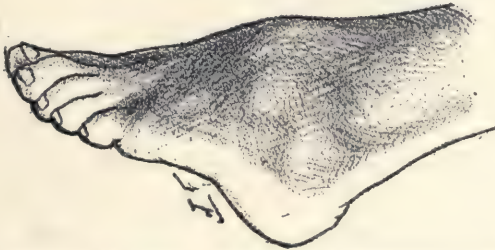


Fig. 1061.—The foot of a Chinese woman (from a photograph) ; it is almost the deformity of a talipes equinus.

- 1st. Elevation of the heel ;
- 2nd. Contraction of the plantar aponeurosis ;
- 3rd. Raising up of the big toe.

(a) In order to overcome the first factor, that is, in order to

bring down the heel, one divides the tendo Achillis, if there is not more than a centimetre and a half in length to be gained, and that is most frequently the case (see p. 677); or one hemisects the tendon (see p. 681) if there is more than a centimetre and a half to be gained.

(b) In order to **correct the vault**, one divides the contracted plantar aponeurosis.

(c) To **lower the great toe**, one divides the tendon of its own proper extensor.

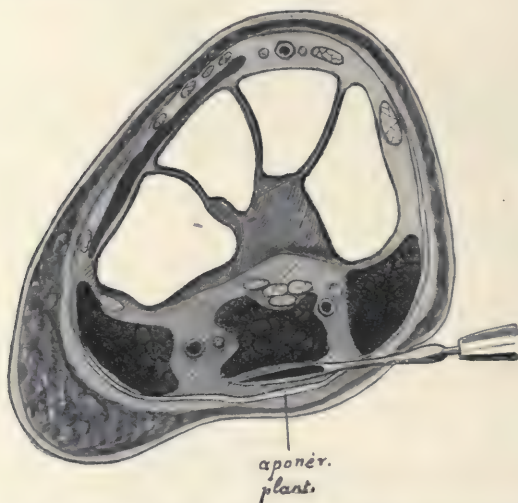


Fig. 1062.—One sees by this section, made at the middle part of the foot, that at this level, the aponeurosis is so far from the vessels that there is no risk of their being wounded, provided that one proceeds carefully.

Technique of Section of the Plantar Aponeurosis

The section is performed by the subcutaneous method.

Should you wish to avoid as far as possible the plantar vessels, divide the aponeurosis at the root of its insertion into the os calcis.

And this one does. Only there is a risk of not reaching the principal fibres of the aponeurosis.

It is therefore more advantageous to make the section opposite the middle part of the foot, that is, at an equal distance between the heel and the toes (see fig. 1062).

At this point, one obtains the maximum of useful effect, and the aponeurosis is found so far removed from the plantar vessels

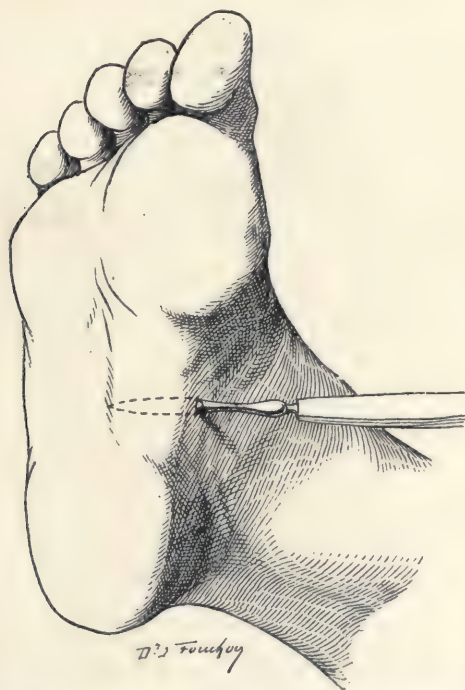


Fig. 1063.—The tenotome penetrates a little behind the middle of the internal border; it finds its way under the deep surface of the aponeurosis.

and nerves that one has no fear of wounding them, at least without an accidental slip of the bistoury or of the tenotome.

But there is a simple and sure method of avoiding all mishap, that is, to divide the aponeurosis from the deep to the superficial surface.

The patient being laid face downwards, an assistant holds the foot in the normal position (neither flexed or extended).

One pierces the skin with the pointed tenotome opposite the middle of the internal border, if it is the left foot, of the external border, if it is the right foot, and one penetrates cautiously, holding the instrument horizontally.

One has traversed the skin and the aponeurosis when the in-



Fig. 1064.—When the end of the tenotome has reached to one-third of the external border of the foot, one turns it round from behind forwards so as to cut the aponeurosis, which is put on the stretch by the assistant raising the fore-foot. One cuts gently, so as not to damage the skin by a slip of the tenotome.

strument has been pushed about three-quarters of a centimetre ; then one travels horizontally and parallel to the skin, between the aponeurosis and the muscle, to nearly the opposite border of the foot.

At this moment, one replaces the pointed tenotome by a blunt one, and turns the cutting edge towards the skin.

Then, the assistant stretches the aponeurosis, by pulling on the fore-foot and on the heel with his two hands; he pulls at first gently, then more vigorously. The aponeurosis stretched in this way is brought against the cutting edge of the tenotome.

The operator and the assistant who pulls ought, both of them, to proceed with method and attention in order to take care

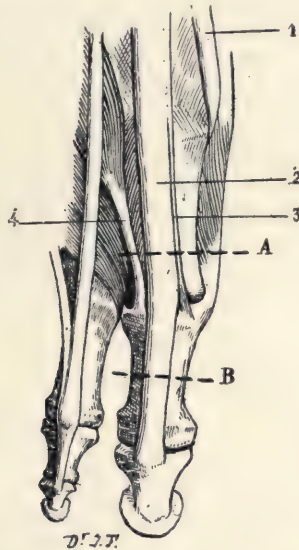


Fig. 1065.—If the section is made over the middle of the first phalanx of the great toe at B, it will only involve the proper extensor of the great toe (2), if it is made at a centimetre and a half behind the metatarso-phalangeal articulation at A, it strikes (as well as the extensor) the central part of the aponeurosis (4) and the two lateral expansions of the extensor tendon, which are inserted on each side of the posterior extremity of the first phalanx (3).

of the skin, which will spilt from one end to the other if they proceed too forcibly.

(Should this happen do not be alarmed, this opening in the skin, if it is ever produced, is not really serious). One is informed at each step, I may say, at each millimetre gained, as to the progress of the section and of the correction: 1st, by slight jerks produced by the rupture of each important aponeurotic

band; 2nd, by the more and more marked obliteration of the plantar concavity; and, 3rd, by the easy proof given that the cutting edge has approached the skin.

When the integument is reached, you stop and withdraw the tenotome.

If there still remain aponeurotic fibres undivided, you will break them by pulling forcibly upon the fore-foot and the heel. If, quite unusually, they do not give way by these efforts, you will again introduce the tenotome, passing it beneath the fibres so as to attack and divide them as you did the main part of the aponeurosis.

By proceeding in this way, you will never have an accident. If you have, by inadvertence, scratched through or even torn through the skin, it is nothing, I repeat, you will not have occasion to suture it; protect the foot with a sterilised compress and make firm pressure to arrest any bleeding—so as to pass on, as if nothing had happened, to the orthopædic manœuvres which should complete the correction.

The divided skin is repaired under the plaster, without there being any need to look at it: it is, however, easy to do so, without removing the plaster, by making an opening over the part, and you can thus inspect it every day until it has cicatrised.

Section of the Tendo Proprius Hallucis

Finally, to bring down the big toe, one divides by subcutaneous section, the trunk of the tendon of the proper extensor over the middle of the first phalanx. One preserves thus the expansions of the tendon, which are inserted on each side of the posterior extremity of the first phalanx (see fig. 1063).

In this section, contrary to what has been advised for the preceding, you will divide the tendon from the superficial to the deep surface.

Of course, as you carry out the three sections (section of the tendo Achillis, section of the plantar aponeurosis and section of the tendon of the great toe) you will ensure the arrest of

hæmorrhage by compressing each new small wound with squares of gauze or compresses.



Fig. 1066.—Talipes equinus.

When all the sections are complete, you grasp the foot (well protected with an aseptic compress) and proceed, by energetic



Fig. 1067.—The same, 3 months after treatment. We have here lengthened the tendo Achillis and divided the plantar aponeurosis and the tendon of the extensor proprius pollicis.

traction, in the appropriate directions, to the achievement of the correction.

One breaks down in this way anything which resists. And even when the tenotome has divided only part of the plantar aponeurosis one succeeds, by vigorous manœuvres, in breaking down the resistance, now isolated, of the two lateral aponeuroses (internal and external plantar).

One feels the fibres gradually give way under the efforts of the hands. And one continues these manœuvres and tractions until the correction, and, better still, a full hyper-correction to almost 20° or 25° has been obtained.

Then one applies a plaster with the foot in this position of hyper-correction. At the end of from 4 to 5 days, the child is able to walk with the plaster and a slipper.

He walks thus for 3 or 4 months. Then one replaces the plaster with a celluloid boot which is worn for six months, taking it off each day for a few minutes to massage and bathe the foot.

After 6 months, the cure is accomplished. Nevertheless, it is wise to continue the use of the boot for a few months longer.

2ND. HALLUX VALGUS

As in club foot, there are here three methods of correction.

1st. *Manipulations* and small movable apparatus, of which the patterns are numerous. Most of these apparatus have on the inner side a straight plate to which the toe is secured by small leathern straps (fig. 1070).

2nd. *Surgical operation*, cuneiform excisions of the head of the metatarsal bone, with or without resection of the projecting extremity of the first phalanx.

3rd. *Forcible straightening*, in one or several stages.

The first of these treatments is too long and not very practicable, in that it requires two sittings every day.

The second, in that it involves a surgical operation, is not practicable for the great majority of practitioners.

I would recommend the third method, namely,

forcible straightening in one or several stages, with or without chloroform, according to the case.

The deviation is straightened by manœuvres analogous to those for the correction of club foot. They should be carried up to hyper-correction and maintained there by a small plaster (fig. 1071).

The plaster should enclose the heel (below the malleoli).

The patient is able to walk with the plaster lodged in a large boot or a sock.



Fig. 1068.—Hallux valgus, or deviation outwards of the great toe.



Fig. 1069.—Hallux valgus (viewed on the plantar surface).

The plaster is left on for two months—then it is replaced by a movable celluloid apparatus of the same shape as the plaster,—afterwards massage, etc.

3RD. HAMMER TOE

In *slight cases*, one performs here forcible correction, then a small plaster, similar to that figured on p. 924 for the treatment of spina ventosa, see Chap. XIX. The plaster

should be very well fitting, constructed over a finger of a cotton glove.

In *old and obstinate cases*, the two extremities of the phalanges are resected with cutting forceps—according to the simple technique found described in all the treatises on surgery.



Fig. 1070.—Small celluloid and leather apparatus, enclosing the heel.



Fig. 1071.—Small plaster (enclosing the heel) to maintain the forced redressment obtained.

CHAPTER XXVI

ADDITIONAL NOTES

1ST. ON THE EXTERNAL TUBERCULOSES

A.—Is it advisable to Operate on the External Tuberculoses?

(See p. 198 of this book.)

(An answer to some surgeons who recently tried to bring surgical operations again into favour.)

TRULY I thought this question was settled—after all my repeated publications on this subject, which I have studied for a quarter of a century.

I had proved in an indisputable way to all those who were not blinded by “routine” or prejudice:—

1st. That the formula of 25 years ago, *i.e.* “that one can or must operate on all external tuberculosis, with the aid of antiseptics” had, in practice, lead to disasters, even in an ideal surrounding such as Berck, as we can show;

2nd. That the comparison constantly made between external tuberculosis and malignant fistula or cancer is absolutely wrong—since we can cure to-day, without operation, the most serious external tuberculosis, Hip Disease and Pott’s disease with suppuration;

3rd. That this healing treatment is applicable everywhere, by all surgeons and in all cases; for it is simply this:

(a) *What ought to be done* to cure external tuberculosis?

Life in the open air (if possible in the country, or at high altitudes, or better still at the seaside); rest of the diseased part, immobilisation by well-made apparatus, that is, comfortable and well-fitting ones, modifying injections into the tuberculous focus, with puncture in case of abscess.

(b) *What ought not to be done :*

Never open a tuberculous focus (hence no surgical operation). Never open cold abscesses and do not allow them to open spontaneously. No violent correcting; only mild and progressive correction by continuous extension or a succession of plasters.

4th. That this conservative treatment, so simple, cures external tuberculosis, not exceptionally, but always (or nearly always), if it is carefully applied.

At Berck, it succeeds 99 times out of 100, not only among the private patients, but even in our hospitals, either applied by us, or by those of our pupils who follow exactly our methods, as Dr. Fouchet, Dr. Cayre and Dr. Fouchou-Lapeyrade. At the Hopital Cazin (at Berck), for instance, in 2125 external tuberculoses treated there in ten years, we reckon hardly 22 deaths—1 per 100.

In Switzerland, at high altitudes, our conservative method, without operation, yields 78 per cent. of cures and 4 to 5 per cent. of deaths, which shows already a fair improvement on the results of treatment by operation. And if these results are, as we see, distinctly inferior to those obtained at the seaside at Berck, the reason is, doubtless, that the sea-air, charged with iodine, bromine, silica, etc., is, for those diseases, more beneficial than mountain air; ¹ true—and it is due to the fact, I am certain, that in Switzerland our methods are not so rigorously applied.

In a word, the first condition to cure an external tuberculosis is to learn to put the bistoury away, for it is the enemy! And the facts are so numerous (by thousands!), they prove so much against surgical operation, that I believed these conclusions to be definitely and unanimously admitted by surgeons and practitioners alike.

¹ This superiority of the treatment of **external** tuberculosis (glandular articular and osseous) at the sea-side over treatment at high altitudes was again quite recently (1912) emphatically affirmed by the Congress of Tuberculosis at Rome.

But what about heliotherapy and altitude? Well, at the sea-side, heliotherapy gives still better results.

"The actinic power of the solar rays," says M. Barbier, physician at the Paris hospitals, "the actinic power, very great on the summits, reaches its maximum at the sea."

The sea absorbs the ultra red (caloric) rays, and reflects the yellow (luminous), blue, violet and **ultra violet** rays, which are the chemical or actinic rays the power of which as bactericides is now well known.

But I will not insist here on such a subject, wishing to avoid, with the greatest care, anything that may imply a pleading **pro domo**.

I was mistaken. It was only a truce—followed by a renewed attack of the bistoury on external tuberculosis. During the last year in surgical reviews of the highest authority, some surgeons, of Lyons, called us, who are conservative in this question, “laggard and reactionary.” They announced to the world that the true doctrine, that which will reign to-morrow, thanks to the mask and gloves, thanks to the air pump and to the lead stopping of the bones, is the resection of dry hip disease of 5 months standing in 4 years old children!—being resolved to operate upon them as soon as the diagnosis of hip disease is established.

That is what has been said and done! But what is worse still, in my opinion, is that surgeons of the Paris school (two of them, at least) follow the Lyons surgeons, and have written:

“The road followed by surgery as regards tuberculosis is going to be changed. The method of Berck (injection) is going to give way to the method of Lyons (bistoury).”

It is now no longer possible to ignore such statements; and as the Berck method has been especially attacked, I am obliged to compare again the two methods—the conservative and the operative—the treatment by injection and the treatment by the knife.

By doing so I feel certain of being of real service to those practitioners who have been beguiled by the fine language of the “interventionists at all costs”; I feel certain of saving those practitioners from many disasters and many personal disappointments.

I will consider both methods without bias, endeavouring to give each its due. I wish only to remind you that I have practised *both* extensively for the 21 years I have been at Berck; I am conservative to-day, but I was a great interventionist 20 years ago. Before being “Monsieur des injections,” I was called when I started my practice, “le chirurgien coupe-toujours,” as far as external tuberculosis was concerned.

But it is not only by the results I myself have obtained with the one or the other method that I will judge them, but also by the results obtained by other surgeons of Paris, Berck, and other places, who are especially interested in external tuberculoses.

To be clear and precise, I must divide external tuberculosis into three groups: suppurated, fistulous and dry (or pulpy).

1. Suppurated Tuberculosis

(Including those very serious tuberculoses—Coxitis and Pott's disease with gravitation abscesses).

What are the two methods worth here ?

To judge them fairly, to establish their respective value, we must appeal to those who make the best punctures as well as to those who operate best upon the tuberculoses, that is, those who possess the best technique for the one or the other method, and whose asepsis is equally good.

But, some will say, if every one cannot perform a perfect operation, at least every one knows how to make a puncture.—What a great mistake . . . unfortunately too common ! There are hospitals—even large hospitals—where operations are cleverly performed, but where punctures are very badly done ! More than that : the head of the service thinks so little of the puncture of a gravitation abscess that he leaves it to be performed by his assistants ; the house-surgeon, in his turn, leaves it to the non-resident student, and this last leaves it to any one who cares to do it.

Would they leave the aspiration of a pleurisy thus ? And yet that would be less serious, for this pleurisy, infected by a lack of asepsis, or by a fault in technique, would be far less difficult to retrieve than an infected Pott's disease—which nearly always means death to the patient when it is infected.

In other words, one takes great pains in operating upon a tuberculosis, but one takes none in puncturing it.

But happily there are surgeons who are as careful in performing a puncture as in performing a laparotomy : such are surgeons for children : such are all or nearly all the surgeons at Berck.

And do you know the results obtained by those surgeons in suppurated tuberculoses including hip and Pott's disease ? An aggregate of cures ranging from 98 to 99 per cent.

And now compare this with the results obtained by the most expert operators.

Taking the best statistics of operations, we arrive at one-third cures, one-third re-formation of the purulent collection, one-third persistent fistulæ. This means, in favour of operation, 33 per cent. of definite cures as against 98 or 99 per cent. for punctures.

So much for the proportion of cures. But what shall we say of their quality, always better after puncture, obtained without danger, without any of the risks involved in a surgical operation, sometimes

very extensive, for instance, when one has to deal with a case of Pott's disease ?

2. Fistulous Tuberculoses

It would seem that the number of fistulous tuberculoses which the operators would claim for their knives ought to be very great.

But no : the surgeons of the Lyons school already mentioned leave fistulæ to the conservative methods, acknowledging that in those cases operation is too often unreliable.

Well, this time I agree with them ! or rather, they agree with me, as for a long time I have maintained—after having practised both methods—that fistulous tuberculoses ought to be treated, not by operation, but by injections of medicated pastes. And I might mention that those injections we have made at Berck ever since 1897—that is to say, 10 years before Beck of Chicago made them (see pp. 176 and 224).

3. Dry or Pulpy Tuberculoses

(a) *First, in the adult :*

The principle is that tuberculoses can be operated upon if one is sure to cure them by operation and sure to cure them without blemish, or at least with no worse blemish than that left by the conservative treatment.

I will explain myself :

It is not justifiable to operate on Pott's disease because, here, the operation would not be complete and would not be immaterial—far, if it does not cure, it will be harmful by leaving a fistula ; hence a new state of the patient, a hundred times more dangerous than if nothing had been done. On the contrary, **operation may be justifiable** in cases of **very accessible** tuberculoses, when it can be done in a thorough manner ; it may be adopted, provided the second condition is fulfilled, namely that it does not leave a blemish greater than the conservative treatment may leave.

For instance, one may operate upon a tuberculosis of the ribs or of the shoulder-blade, one may re-sect a tuberculous knee in the adult, or remove a glandular mass in a remote region of the body.

I do not say that an operation is to be preferred in all these cases ; far from it. But one may be done, whilst it must not be thought of for adenites of the neck, where it leaves a blemish—the cicatrix ;

nor for hip disease, where resection leaves an infirmity—whilst, on the other hand, the conservative method with injections cures without blemish, adenitis of the neck, spina ventosa, and coxitis.

I am also opposed to operations in cases of tuberculosis of the epididymis and of the testicle, for, out of the 260 cases of those tuberculososes, at all stages, which I have seen during the last twenty years and treated conservatively, *all* have been cured *without exception*, with the preservation of both testicles; true, the cures took from 3 to 9 months, and even, in one case, two and a half years.

But tell me which is best; to spend two and a half years in order to preserve them, or two and a half minutes in order to LOSE THEM for ever?

(b) *Lastly, dry tuberculosis in children.*—Here I condemn surgical operations, especially in tuberculosis of the bones, and more still in hip disease—as, I believe, all surgeons practising amongst children condemn them.

And the observations published by the Lyons surgeons, on resections performed by them in dry hip disease in children of 4 years of age, 5 months after the beginning of the disease, have not altered my mind on that point.

I will not argue with those very distinguished colleagues upon their immediate results, or upon the fact that, in several of those children, the air pump, the lead stopping of the bones and all the rest of it, have only succeeded in the end . . . in transforming a closed coxitis into a fistulous coxitis!

I will not argue on that. I am pleased, on the contrary, to admire the perfection of their technique and of their asepsis. But what of the orthopædic deformity left by the resection or erasion of the head of the femur,—that is, by suppression of the growing cartilage!

Even if there is not left at once a very marked lameness, what will there be in a few years, in 4, 6, 8, 10 years? We know only too well.

Whom did those, who have performed such early resections in quite small children, wish to convince that their orthopædic results equal, ON AN AVERAGE, the results of the conservative treatment in coxitis?

The operation may have been splendid, but it has been unfortunate—it has made cripples . . . “Your work is beautiful,” I tell them; yes, but may it not at the same time be mischievous?

I cannot dwell here on the facts in detail,¹ but I believe I have said enough to enlighten you as to the new mania for resection.

I might have waited for the natural death of this method, as the German mania for resection died 25 years ago, for this is only a new edition, revised and corrected (for the so-called new method is not new at all!).

I might have waited for its death in a few years, but before disappearing it might have caused so much harm that I felt it my duty to denounce it here and to warn practitioners against such dogmas!

B.—The Safe and Practical Method of preparing the Liquids and Pastes for Injection into Tuberculous Foci²

(See p. 122 of this book.)

Against suppurated external tuberculoses, wherever their seat may be, there is only one treatment for those who have given a fair trial to the different methods; the treatment by punctures and injections.

The question is settled. I do not think there is a single surgeon treating children who would operate on a cold abscess rather than puncture it. Surgeons treating adults are also coming round to punctures; they will all do so in the end, whether they like them or not. And if there are some blind or obstinate enough not to be convinced, it will be bad not only for their patients but for themselves, for the surgeon who operates upon extensive suppurated tuberculoses remains in an erroneous position and is courting all kinds of personal mishaps.

There is no longer any discussion possible on this subject, because the method by punctures and injections is so much superior to the other, both as to the number and the quality of the cures.

But this method, which is *the best*, has also the great advantage of being *the simplest*—it is a method which can be applied everywhere, that is, to all patients and by all practitioners; it demands no special surgical education, nor special installation, nor complicated or expensive instrumentation.

What fault can be found with this method of puncture? Truly I do not see any, except one, perhaps, which is merely the excess of one quality; its too great simplicity, or, rather, its too great APPARENT simplicity, which might induce a certain carelessness in those who apply it.

¹ I refer you to the whole of the first part of this book, pp. 110 to 564.

² This article (1013 to 1020) is written by my assistant, Dr. Fouchet, of Berck.

Let practitioners be forewarned ; they must realise that, although simple, the method requires a deal of attention, and will fulfil its promises only on condition that it is applied very carefully, and with an absolute asepsis. If asepsis is not perfect, more harm will have been done than good, and it would have been a hundred times preferable to have abstained from it.

“Asepsis in performing a puncture must be as thorough as in performing a laparotomy,” Dr. Calot has said, for a long time.

Unfortunately, this precept is too often forgotten or ignored. Many faults against asepsis occur in punctures, and especially in injections, on account of the great difficulty there is in obtaining properly sterilised modifying liquids.

For this reason I would like to give on this subject a few practical hints not to be found in books, and which will enable practitioners to avoid this faulty asepsis.

Let us proceed in order :

1st. *Asepsis of the hands.* On this subject, I have nothing to teach you. If, in spite of careful washing, you still have doubts as to the absolute cleanliness of your hands, wrap them simply in a compress which has been boiled ; your fingers will still be free enough to push in the needle and to handle the aspirator or the syringe ; a puncture or an injection does not require such precise manipulation as does the suture of a stomach.

You can, however, use gloves ; you can make them on the spot (using by preference a waterproof tissue—see figs. 108 and 109).

2nd. *Asepsis of the operation field.*—Here again there is nothing unknown to you ; paint the skin freely with iodine tincture ; do not be afraid of using too much of it, as you can always remove any excess of iodine (after the small and short intervention) by washing with alcohol.

3rd. *The sterilisation of the instruments* is very simple if you make use of the Calot set (fig. 1072), of which all the different parts can be boiled ; an aspirator with an asbestos piston, a glass syringe of 10 c. cm. capacity, one or two nickel-plated steel needles.¹

Put them in a fish-kettle $\frac{3}{4}$ full of cold water gradually heated up to boiling point ; by so doing your aspirator or your syringe will

¹ Never pass steel needles through the naked flame ; they would deteriorate. Platinum needles can stand the naked flame ; but their excessively high price prevents their being commonly used.

never break, as they would surely do if you were to dip them suddenly into boiling water.

See that your instruments are completely immersed in water up to the time of using them; you will thus avoid their becoming tarnished or "spotted."

As soon as you have done with them, wash them with warm water and with alcohol, and dry them well. If they are washed and dried each time after use, a short boiling of 5 or 10 minutes will be sufficient before using them at the next sitting.

4th. Now I come to the fourth point, to the most important as well as the most embarrassing question for most practitioners,

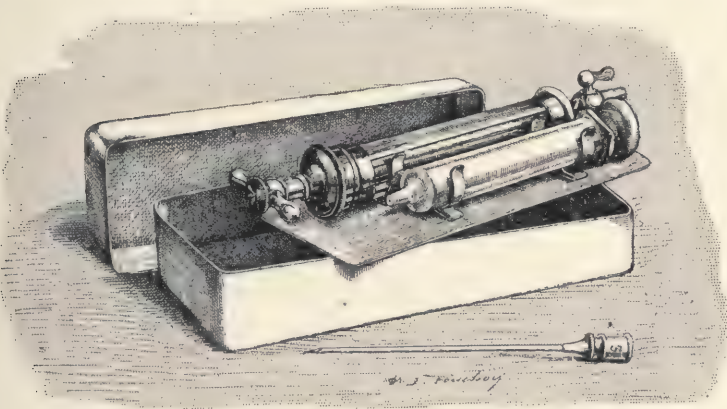


Fig. 1072.—Calot box containing an aspirator, a syringe and a needle.

namely : *the asepsis of the different modifying substances to be injected into the tuberculous foci.*

(a) *The most important chapter.*—If non-aseptic hands, instruments, or dressing material insufficiently sterilised, can be so many causes of infection, what shall we say as to the injected liquids which remain in the cavity, and whose septic germs, if they contain any, can freely grow and multiply in this closed vessel, in the best possible medium? It is like the wolf shut up in the sheepfold!

(b) *The most embarrassing chapter* for practitioners, and, on this account, often disregarded by them.

This is what happens in practice. You ask your pharmacist to prepare the liquids. But does the ordinary pharmacist know that

the slightest fault on his part may bring about the infection of the abscess and perhaps the death of your patient ?

Can you be certain that he will assure asepsis more in this preparation than he would in the preparation of a julep, or even

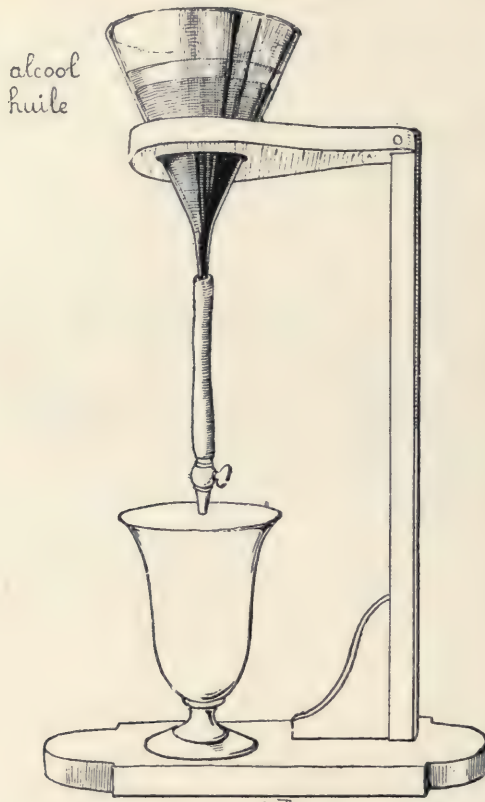


Fig. 1073.—To remove acidity from the oil, add to it some alcohol in the proportion of 1 per 100; shake and allow it to settle. The oil, heavier than the alcohol, runs out first when the tap is opened.

of an enema ? Are you quite sure that, if he is very busy, he will not leave the preparation to his "errand boy," who will be still less careful ?

Am I exaggerating much ? There are, of course, I know, many

very honourable exceptions, but is not my criticism too often founded on fact ?

But could not these preparations be obtained from some of the more important laboratories ? No ; it would not be practicable. Besides the fact that the cost would be too great, you may have to inject, in suppurated tuberculoses, liquids varying greatly as to quantity and quality, according to the different cases, even varying them at times in the same case.

And, on the other hand, there are certain substances, such for example as camphorated naphthol and glycerine, which must not be prepared much beforehand.

What then ? Well, there is only one way, only one wise, certain, and practical way. That is to trust only to yourself for the preparation, and as it is a vital question for your patient, do not hesitate.

You sterilise your instruments yourself ; it is more important still not to leave to others the preparation of the substances to be injected and left in the tuberculous cavities.

The preparation is not very difficult, as you will see ; no particular *tour de main*, no special knowledge is required.

I have charge, in the practice of Dr. Calot, of the preparation of these medicated substances, and, after the few unavoidable difficulties at the beginning, I succeeded easily ; and it is to spare you those slight difficulties that I want to tell you the right method ; all the more so that you will not find in your classical treatises, I repeat it, the necessary practical indications on the subject.

LIQUIDS¹

1st. *Camphorated Naphthol*.—Camphorated Naphthol is an antiseptic in itself ; the only precaution to take is to keep it protected from the light to prevent its decomposition, shown by its change of colour (it may become black, whereas when fresh it is clear).

When naphthol is used mixed with glycerine (camph. naphthol 1 gramme ; glycerine 5 grms.) the glycerine must be sterilised by boiling beforehand.

¹ Although I do not intend to give you the indications for each liquid, I would remind you that there are a number of them, perhaps not of equal value, with which you can obtain good results, and which can be divided into two groups ; the softening and the sclerosing liquids ; among the first, the most often used is the glycerinated camphor naphthol ; among the last, iodoform creosote and oil.

It is as well, perhaps, to repeat here that this mixture, being very unstable, must be prepared and shaken vigorously for one and a half minutes *immediately* before it is injected.

2nd. I will mention, in the second place, a liquid of very easy preparation, made simply by mixing equal parts of camphorated naphthol, camphorated phenol, sulfuricinated phenol and spirit of turpentine. (This is the “4-liquids softener” of Dr. Calot.) Acting vigorously in an injection of 4 or 5 drops, this liquid can render you great assistance in starting the softening of a very hard tuberculoma which has remained unaffected by glycerocamphorated naphthol.

3rd. *Iodoformed-creosoted oil*.—Its formula is :

Olive oil	70 grammes.
Ether	30 —
Creosote	5 —
Gaiacol	1 —
Iodoform	10 —

To prepare this mixture, procure very pure olive oil, the acidity of which you remove with alcohol (fig. 1073) ; sterilise it by boiling in any kind of receptacle (if it is pure it will not blacken on boiling).

In a mortar, previously passed through the flame, you mix and triturate the iodoform, the creosote, and the crystallised gaiacol in the proportions indicated.

Upon this you pour slowly the oil, stirring with an aseptic glass rod ; but the oil must have previously been allowed to cool down to below 60°, because the iodoform would be decomposed at a high temperature. And in the same way you will add the ether only when the oil is perfectly cold, to avoid its evaporation.

When your mixture is finished and well stirred, place it in a glass-stoppered flask, sterilised by boiling in water, and keep it protected from the light.

Shake the flask before each injection.

PASTES

For fistulous tuberculoses, Dr. Calot advises the injection of practically the same active reagents, and they are those indeed which procure the most certain and most rapid cures ; the substances used as vehicles alone are changed ; the olive oil, for instance, is replaced by lanoline or spermaceti.

But the use of one vehicle in preference to another is not a matter of indifference; you must choose products of animal or vegetable origin as being those alone capable of absorption by the tissues; products of mineral origin, on the contrary, are not capable of being absorbed, they remain indefinitely where they are injected, hindering the drainage and causing sometimes actual retention of pus and all sorts of accidents which may even bring about death. You understand from this why the preparations containing paraffin must be rejected.

For this reason lanoline and spermaceti will entirely satisfy you. Here is the formula of the mixture:

Lanoline	50 grammes.
Spermaceti	50 —
Camphorated naphthol	6 —
Camphorated phenol.	6 —
Iodoform	20 —
Creosote	8 —
Crystallised gaiacol	7 —

This preparation is liquid at 104°.5 and solid at 101°.

You must ask your chemist for absolutely pure lanoline, and refuse all lanoline not perfectly white, or showing a yellowish tint; otherwise the melting point of your mixture would be too low and it would not solidify at the temperature of the body.

METHOD OF PREPARATION.—Lanoline and spermaceti are mixed and heated to boiling point in any kind of vessel (by preference one of porcelain or earthenware). Some precautions are to be taken when boiling this mixture, for it will “boil over” just as milk may do when it is being boiled. So that you would be scalded if you were not careful *to stir continuously* with a glass or a metal rod.

When these two substances, lanoline and spermaceti, are thus sterilised, let them cool down to about 122°; but do not wait until they are solidified to incorporate the other products given in the formula, and which must have been previously carefully mixed and triturated in a sterilised mortar.

Keep the preparation sheltered from the light.

The mixture, solid at the ordinary temperature, is of a fine yellow colour, and must preserve that colour.

When you wish to use the mixture, warm it in the water-bath up to about 105°, where it liquefies (this takes 8 or 10 minutes).

Be careful not to let it reach 135° or 140° and, of course, do not

let it boil ; the iodoform would be decomposed and the mixture would assume a brownish tint.

Inject it by means of a glass syringe of 10 or 20 c. cm. capacity, fitted with metallic nozzles of different shapes according to the direction and the depth of the fistulous track (see fig. 147 to 152).

Keep a tampon on the fistulous orifice—or orifices—up to the solidification of the mixture, which requires one or two minutes (see fig. 159).

Whether the tuberculosis is open or whether it is closed, apply a copious dressing, covering it well ; do not be content with the classical collodion applied over the cutaneous orifice.

If you do all this—and you see that it is not particularly difficult—you will ensure the perfect asepsis of the punctures and injections and you will cure your patients without any difficulty, always or nearly always, perhaps 99 times out of 100. Is there any other method (operation or abstention) of which the same can be said, which would yield results to be compared with these ?

It is worth our while to observe all possible precautions if thereby we are to attain such beautiful results !

C.—On Fistulous Tuberculoses

(Refer to pp. 166 and 212.)

(a) Preventive Treatment

(The real treatment of fistulæ is to prevent their formation. It is he who knows WELL how to puncture, who can avoid them.)

Certain truths must be repeated again and again :

— In tuberculosis, the danger is fistula.

— Death is still often ¹ the ending of external tuberculoses (especially of suppurated hip or Pott's disease).

— And nine times out of ten, death is due to a fistula (or to its consequences, hectic fever, albuminuria, visceral degeneration).

¹ But still I am far from agreeing with what a hospital surgeon wrote quite recently, that "Pott's disease ends in death in half of the cases"!!!—If this is not a *lapsus*, it is a gross exaggeration, and I cannot believe that, even in a very old and unhealthy hospital in a large town, the mortality can be so great, unless the methods followed there are particularly defective ; if, for instance, they still open and operate on all abscesses in Pott's disease. If this is the case, I understand too well, alas ! that they will have such a high rate of mortality.

— So that surgeons could avoid 90 per cent. of the deaths from external tuberculoses if they could suppress fistulæ.

— Is it possible to suppress fistulæ ?

— Yes : not so much by seeking for a new way of curing them as by using the means, which we already possess, of preventing their formation.

The Causation of Fistulæ

1st. **The greatest producers** of fistulæ are the **surgeons who operate** on external tuberculoses and open abscesses.

So that those who operate upon external tuberculoses are those who will most often see fistulæ and also the greatest number of deaths.

2nd. As producers of fistulæ come next (but far behind the first), the *practitioners* who never interfere with *abscesses* and so *allow them* to open. This spontaneous opening of abscesses occurs once in two cases on an average.

3rd. And lastly, those who *puncture badly* are also producers of fistulæ.

I have spoken at some length of the first two cases, but not sufficiently of the third.

No, I cannot repeat too often that punctures are generally very badly done. And the worst of it is that every one thinks he knows how to make them.

If it is easy to prevent the first two causes of production of fistulæ, since it is sufficient there to replace operation or abstention by puncture, how are we to avoid the third cause ? How are we to teach the method of puncture to practitioners who, thinking they know more than any one else, will not listen to our teaching ?

If they would only look at what is going on around them, their eyes would soon be opened as to their ignorance and their inability to perform a puncture. Indeed, one could find two hospital services in the same large town, perhaps even in the same hospital, where punctures are performed ; but whilst in one of them, punctures prevent fistulæ at least three times out of four, in the other, it is the inverse proportion that is the rule : 3 times out of 4, fistula follows puncture (notwithstanding the puncture, and oftentimes, because of the puncture) !

At Berck, fistula is avoided not only 3 times out of 4, but 99 times out of a hundred. One could object that this superiority in results is due to the nature of the climate and the general treatment ; it

may be so, and this is why we have compared two hospital services in the same large city, that is, both situated in the same surroundings.

Now is not this difference of results of the two services striking enough ! Does it not show clearly enough the difference between good and bad punctures !

Will there still be found after this, open-minded practitioners who, unable to avoid fistulæ, refuse to admit that they ignore the use of puncture and that they have the greatest need for learning the method ?

How to Learn to Perform Punctures

Evidently the best way is to see it done—to make a stay, if ever so short, at Berck or in some private hospital where punctures are well performed (which will be easily recognised by the fact that there, in 9 cases out of 10, fistula is avoided).

And it is for those practitioners who cannot go there or, rather, *who will not go there*¹—for all could go if they chose—it is for them that we have described at length, in 50 pages, all the details of the technique of puncture, with all the accidents that may happen and the way to surmount them (see Chap. III., pp. 115 to 163).

We will not go over the same ground again ; we will merely remind them, in a rapid enumeration, of the principal faults which can be committed : *faults of which fistula is the result and the punishment.*

(a) Lack of asepsis, too likely to happen in those frequently repeated interventions which seem somewhat banal and of small importance.

(b) Large needles are used, instead of our No. 3 or 4.

(c) The abscess is kneaded too roughly, in order to empty it, instead of aspirating the pus gently with our small aspirator.

(d) The needle is pushed straight in upon the prominent point of the abscess, where the pus is near the skin, and where the skin is very thin, whilst one ought to puncture far away in a sound part, and reach the abscess by a sub-cutaneous, or even sub-aponeurotic path, very obliquely.

(e) Puncture is made too late, when the skin is already red and threatened, that is, is already infected by tuberculosis ; in this case

¹ And why will they not go ? How can they better spend their time ? To learn how to treat all the external tuberculoses (those exceedingly frequent diseases !), what a new string to their bow ! What a splendid way to raise their status, moral and even material ! I could so easily support these remarks by facts and examples.

the skin can no longer be SAVED, it will give way and a fistula will result.

(f) The punctures are made too frequently, or too rarely.

(g) The number of punctures is either too great, or insufficient.

(h) The injected liquids are too active, or not active enough ; the dose is too great or too small.

(i) The constant blocking of the needle, the slow emptying of the abscess causes impatience ; one pricks the skin all over with the needle, or one decides to " have done with it " and open the abscess !

You must know that sometimes (for an abscess in Pott's disease, for instance) you may be obliged to make up to 70 punctures in order to empty it (as has happened to me), but by so doing it is cured. Had we stopped before, it would have meant a fistula, and one or two years later, very likely the death of the patient.

So then, one errs by ignorance or by lack of faith. One ignores all that can be got from the method by punctures (a method, let us repeat, which, well applied, cures always or nearly always, 99 times in a hundred).

And these remarks apply as well to foreign as to French practitioners. During my travels abroad, I have been convinced that those punctures are even more badly done than in France.

There, also, they lack faith, because they have not seen them well done. Ah ! let me say it again, if only all the practitioners in France and abroad, who have to treat suppurated tuberculoses, could come and see what the Berck surgeons obtain from this method of punctures ! . . .

On the whole, the way to avoid fistulæ is to puncture, provided one knows how to puncture properly.

So much for the preventive treatment of fistulæ.

Now we come to their curative treatment—for, alas ! we shall always see patients coming to us with fistulæ already existing without taking into account the fact that, once or twice in a hundred cases, I admit, whatever is done, even if punctures are faultlessly performed, it is not always possible to avoid the production of a fistula.

Curative Treatment of Fistulæ

The treatment can be summed up thus :

Local treatment : asepsis and injections of our medicated pastes, rest, and immobilisation of the affected part.

General treatment : life in the country or at a high altitude, or,

better still, at the seaside. Continual exposure to the open air, to the light, and to the sun.

One succeeds thus—with patience and in time—in curing the whole (or nearly) of the fistulæ which come to us not infected, that is, without fever or albuminuria.

For infected fistulæ (fever and albuminuria), the same treatment, adding to it a milk diet, and dispensing with the paste injections. These injections of pastes will be made only after the disappearance of fever and albuminuria, if ever they disappear; this one cannot definitely promise when it is a question of infected fistulæ of Pott's or of hip disease (which still too often mean death to the patient, sooner or later, from visceral degeneration and general wasting of the organism); but one can promise the cure of fistulæ of other regions, even when they are infected, for, if drainage and antiseptics do not cause the fever to subside, there is always the supreme resource of amputation; but it is seldom that one has to resort to that. It is now more than 5 years since, in my own practice, that I have had to perform a single amputation for tuberculosis.

We will not now return to the technique of the curative treatment of fistulæ, described at length in the first part of this book (see p. 170). We will simply give a few observations upon patients, so as to better show you the way to act in the presence of each variety of fistulæ.

Obs. I.—Multiple Fistulæ of the Testicle and Epididymis on both sides. Cure by the Conservative Treatment

The following observation refers to the patient shown in fig. 184, p. 218; Pierre C., 26 years of age, who came to Berck three years ago, very thin, pale, cachectic, with three large tuberculous localisations; dorsal Pott's disease, suppurated costal tuberculosis, and wide and multiple ulcerations of the scrotum, ulcerations giving passage to a profuse, bloody, and evil-smelling discharge.

We will notice here the third focus only. The scrotum was of the size of a child's head, and had now been transformed into a pulpy and suppurating sponge, producing an abundant discharge of pus on the slightest pressure on any one point. In this enormous mass, it was impossible to differentiate the testicle and the epididymis from the tuberculous neoformations.

On the right and left sides, oozing granulations produced a hernia of 3 or 4 cm. through the cutaneous ulcerations.

Here there was no hope of conservation, according to the unanimous opinion of all the surgeons who had seen the patient.

He was told that "the only rational treatment of this ulcerated tumour, affecting both testicles, the epididymes, and the skin, was amputation at the root of the scrotum." This treatment was all the more necessary because

the profuse and evil-smelling suppuration exhausted the patient, suffering besides, as you remember, with two other severe tuberculoses—Pott's disease and a suppurated costal tuberculosis.

And still, notwithstanding every one or everything, hoping against all hope, we decided to attempt conservation.

From all we have said in this book, you may surmise the treatment; rest in the recumbent position (necessitated by the Pott's disease), life on the sea-shore from morning till night.

Local Treatment.—We did our best to disinfect the ulcerations and the



Fig. 1074.—Cure of multiple tuberculous fistulæ affecting both testicles and the epididymes (see Observation I).

fistulous tracks by washing with permanganate of potash, then we injected creosoted oil and iodoform and our medicated pastes.

For five months, no, or hardly any, amelioration; but from that time the general condition as well as the local conditions changed manifestly, so much so that, after one year, cure, although far from being complete, was nevertheless certain. Complete cicatrisation was obtained in $2\frac{1}{2}$ years.

See in fig. 1074 the appearance of the region. The size of the scrotum is nearly normal; on the left, the testicle and the epididymis are of a dimension and a consistency nearly normal; on the right side, one can feel two indurated nodules against the epididymis, but painless and, it seems, formed by cicatrix and sclerosed tissue.

Functional condition; the patient has already some priapism at night; as

yet he does not present "more decisive proofs," but "he may hope for the best." At the same time the general condition has become perfect. The Pott's disease is cured, the pointed gibbosity is effaced (thanks to plaster corsets with compression), the suppurating costal osteitis is also cured (by punctures and injections).

I will repeat here that, for the last 18 years, we have not seen a single tuberculosis, even suppurating, of the male genital organs, which has not been cured by our treatment, lasting, in most cases, less than one year; this case has, therefore, been by far the longest in being cured.

Obs. II.—Eleven Fistulæ (Osteitis of the Leg and the Foot) existing for 21 years and Cured at Berck in 10 months

Etienne K., of Paris, 33 years old, had from the age of 11 years, on the instep, a large tuberculous focus, which had spread progressively on to the leg and the foot.

The bones were affected from the middle of the leg down to the toes. Over this large surface, 11 fistulæ were open when I saw him for the first time.

The pus issuing from all those fistulæ had recently become more abundant; enforced rest in a house at Paris, loss of appetite, and the copiousness of the discharge, had weakened the patient to such an alarming degree that all the surgeons who were consulted had unanimously agreed that the only way to save the patient's life was to amputate the leg, which, apparently, would never heal; a doctor (a radiographer) had even said to the patient: "It is no longer osseous matter that is in your leg and foot, it is merely gelatine and pulp." The danger was immediate and pressing. A fortnight more waiting, he said, and it would be too late; a date for the operation was settled on with the family; it was to be on the Tuesday.

On Monday, the day before, I was called in consultation to Paris, and my opinion, against that of all my colleagues, was not to decide upon the sacrifice of the leg before having made a serious, long and patient attempt at conservation. And I summed up my advice thus: "If, after a reasonable delay, which we will fix ourselves, say after 10 or 12 months of this serious attempt at preserving the leg, we have not arrived at a satisfactory result, then, but then only, I will agree to amputation." I contended, moreover, that by waiting we would lose nothing; that the local and general conditions could only be improved by our treatment, and that, if amputation had to be performed after all these persevering attempts, the leg would be disinfected at least partially; the patient would have then a greater amount of physical resistance than he had now, and, moreover, he would be convinced that the sacrifice of his leg was absolutely necessary and that there was no possible way to avoid it. My colleagues kept to their ground and replied that this attempt at conservation would delay or even compromise a cure, that amputation only could effect it! Well, we could not agree. But when I was gone, the patient declared firmly his intention of following my advice, clinging desperately to this sheet-anchor which allowed him the hope, if not to avoid, at least to put off, the dreaded amputation.

On the day after, he was brought to Berck, against the opinion, I repeat it, of all my colleagues, and even of his own people.

Treatment at Berck : perfect rest, in a small carriage ; outdoor life, on the shore. Daily dressings—and every four days, an injection of creosote—camphorated naphthol and iodoform.

Five months later, great amelioration in the general condition, but, I had to acknowledge, no appreciable local result. We were in the sixth month of this treatment when I thought I could see a slight improvement in the fistulous openings. And indeed, at the end of the month, two fistulæ (out of the eleven) were closed.

During the seventh month, another one was healed ; in the following month four, then three. At the beginning of the tenth month, only one remained. From that time I felt certain of the cure of the patient. The cure was effected ten months and a half after the beginning of the treatment.

The cure, complete and definite, is still maintained, after ten years. For ten years the patient has carried on his tiring work ; he goes about with his foot, which, massaged regularly, has regained, not only strength, but even suppleness ; he makes good use of the foot and the leg of which the radiographer said, "They are not bones that you have there, but a mass of gelatine" !

Obs. III.—Ulcerated Tumour which had destroyed the Skin of the Anterior Part of the Leg ; the Ulcers, which had existed for Two Years, and which we recognised as being Tuberculous, have been cured in 8 months

This is the patient shown in fig. 186, p. 220. He is a man 35 years old, Pierre B., of Lyons, sent to us by his brother, a doctor, for an ulcerated tumour of the anterior aspect of the leg, a tumour which had resisted all treatments for nearly two years.

There had been much hesitation and discussion as to the nature of this ulcerated tumour, which presented all the appearances of an epithelioma. There were five ulcers each the size of a 5-franc piece, separated by small, cutaneous bridges, of hardly a few millimetres in breadth, of low vitality. Soon, indeed, these bridges were destroyed in their turn and there resulted a vast ulceration, larger than the palm of the hand, with thin and irregular edges ; the ulceration resting upon a downy and greyish-coloured ground. A cancerous tumour, I repeat it, was thought of, then syphilis, then a mycosis, and lastly an osteosarcoma ; this confusion was increased rather than dissipated by radiography (see fig. 1075). At last the diagnosis was settled by the bacteriological examination of the ichorous liquid produced by the ulceration : Koch's bacilli were found in it.

Treatment.—We had to resort to all kinds of local treatments, changed every day, namely : our powder (see p. 157), that of Championnière, zinc peroxyde, neol, camphorated naphthol, iodine solutions, etc., and radiotherapy.

But for three months nothing was of any avail ; it was only after this long time that we were able to notice a slight sign of cicatrisation. Then from that time it progressed, but how slowly ! and even at times we had relapses. Eight long months were necessary to obtain complete cicatrisation, but this time it was definite.

Obs. IV.—Type of fistulæ in the neck following on multiple tuberculous glands, which was readily cured by our conservative methods

The patient is represented in fig. 179, p. 215.

Gabriel de T., 24 years of age, a worker. The fistulæ had existed for three years, and had resisted every kind of treatment before his arrival at our Orthopædic Institute.



* Fig. 1075.—Wounds and fistulæ resulting from surgical operation in the case of a coxalgic with a closed abscess. The patient had no fistulæ before the operation: the surgeon promised that it should be a radical cure: it left 23 fistulæ. The patient has been with us at Berck for only five months. Of the 23 fistulæ, existing 16 years, we have already closed 20 with our injection. At the end of seven months three very small fistulæ remain. (See the following figure.)

However, he has been cured (see fig. 180) after five weeks of treatment at Berck. The local treatment consisted in the application of our powder and compresses soaked in our paste for fistulæ.

One observes in fig. 180 that the patient preserves only insignificant scars which are scarcely noticeable.

No surgical operation would ever have given so excellent a cure as that obtained by our conservative method. It is improbable that such an operation would have cured the fistulæ, and it would certainly have left scars a hundred times more visible than our treatment has done.



Fig. 1076.—The same (see fig. 1075) after 18 months of our treatment. Cure very nearly complete. The patient has nearly doubled in weight: 50 kilos instead of 30.

Obs. V.—Twenty-three infected fistulæ in a coxalgic, which had existed for fifteen years. Twenty of the fistulæ have already been closed in one year: the three remaining are insignificant. The infection having disappeared, the patient has nearly doubled his weight

Here is a coxalgic, twenty years of age, Cariberto B., from Buenos Ayres, who arrived here with 23 fistulæ, disseminated all around the affected hip, on the pelvis, and right up to the root of the sound limb. The fistulæ had existed for 15½ years. The first had succeeded (soon after the onset of the disease) resection of the hip (made for a closed hip-disease!). A new operation

was performed with the hope of curing the fistulæ; only result, 3 new fistulous openings; operations were again performed at repeated times in America, in France, and in Germany. The more the patient was operated upon, the more fistulæ were produced, and the more he wasted away. And in spite of all these, a new operation was spoken of at Paris when he was taken to Berlin to consult Professor Bier, who, considering the very bad local and general condition of the patient and the failure of all operative treatment, sent him to us to be treated by our conservative methods.

He came to Berck a little over a year ago—nearly dying. He weighed 30 kilos. (at the age of 20 years!). His complexion was yellowish and dull, he was dyspnoic, strengthless, sad, nearly inert, with a broken voice. His wounds and all his body exhaled a most objectionable odour, which could be perceived at a distance, and was extremely disagreeable to himself and to all those who lived in the same house, his 23 fistulæ giving vent to a quantity of very fetid pus.

Urine scanty, with traces of albumen, appreciable hypertrophy of the liver, which extended slightly below the false ribs. Evening temperature above 99° F. Alternating constipation and diarrhoea.

Such was the state of the patient when sent by Professor Bier. Although we had confidence in our treatment and in the life at Berck, we did not, we dared not, promise to cure him. "There are only 1 or 2 chances in 20 of saving him," we said.

Treatment.—We ordered complete rest (dorsal decubitus). We endeavoured to disinfect his wounds by daily baths, dressings with lysoform, or permanganate of potash, twice every day, etc. We made him live the whole of the day on the shore, lying on a frame. Soon the fetid smell with which he was impregnated subsided. He could eat a little, rest, and sleep. His icteric complexion brightened up, his urine became a little more abundant (we had ordered milk diet).

At the end of three months there was no trace of albumen; the temperature was normal again; the discharge less copious and no longer fetid.

Shortly afterwards we began the injection of our paste, the injection being pushed in through one of the fistulæ whilst 3 or 4 assistants were occupied in stopping the other 22 fistulous openings in order to prevent the injected paste from escaping. We repeated these injections about every ten days.

After five months of this treatment and of 2 dressings a day, 14 fistulæ were closed and the patient was 10 kilos heavier!

To-day, after a little over a year of this treatment, there remain only 3 small insignificant fistulæ, giving issue to hardly a drop of pus, and which are dressed only every week.

It is even no longer pus, but a perfectly odourless serosity. Complete cicatrization is now certain and even near at hand. The patient weighs 50 kilos (instead of 30, as on his arrival). He looks pink and fresh, and is lively and happy.

This is an example of the "resurrections" which we may sometimes obtain, which must be aimed at, but which it is not safe to promise as certain, when it is a question of patients as cachectic and as infected as this one.

Obs. VI.—Hip-disease with 15 fistulæ. The sea (with our injections) succeeds where altitude (with heliotherapy) has failed

Berthe C., 17 years of age, of Zurich, came to Berck 18 months ago, pale, cachectic, lame, and suffering from a right hip disease. Swollen hip covered with fistulæ; there were fifteen of them suppurating abundantly and necessitating daily dressings. The child had just been treated for 2 years in a sanatorium (on the mountains in Switzerland) by heliotherapy, but without success, for, notwithstanding this treatment, very strictly applied, the general condition of the child was becoming constantly worse, and instead of one fistula which she had on arriving at the sanatorium, she had 15 infected fistulæ and fever. Her parents, who had lost all hope of saving her, had taken her



Fig. 1077.—15 fistulæ in a case of hip disease for which the heliotherapeutic treatment in Switzerland had failed. The Berck treatment was successful (see next figure).

home again, when a distinguished doctor from Cairo, Professor Hobbs, saw her and suggested her coming to Berck.

Treatment at Berck.—Rest, as complete as possible (the parents having refused the absolute rest which we had prescribed). Disinfection of the wounds by irrigation with permanganate of potash and lysoform.

After 3 months we began our injections of pastes at the rate of one about every 12 days (see the technique of these injections on p. 169).

This treatment has been continued for one year; the actual condition of the child is entirely altered.

From being cachectic and yellow, which she was, she is now fresh and pink and full of life; she has gained 10 kilos. The 15 fistulæ are closed except three, from which there is a slight oozing, and they are dressed once

or twice a week ; and even these small fistulæ have been closed several times here, but have reopened after a short time.



Fig. 1078.—The same child (see fig. 1077) nearly cured to-day, after 18 months of our treatment at Berck.

We have to-day the moral certitude of being able to close permanently and definitely those fistulæ, and that in the near future.



Fig. 1079.—Tuberculosis of the wrist with sequestrum. Observation VI.



Fig. 1080.—Explanatory sketch of the radio in fig. 1079.



Fig 1081.—The sequestrum has been removed without operation. Notice in this figure the adaptation of the articular extremity of the radius to its functional rôle ; it has slightly developed inwards, so as to supplement the missing inferior extremity of the ulna.

Obs. VII.—Fistulæ with a large sequestrum produced by necrosis of the inferior part (the lower fourth) of the ulna. It had been said that the hand ought to be amputated. Nevertheless it has been cured without operation. The sequestrum was eliminated spontaneously. The cure was effected only two years after the elimination of the sequestrum. To-day the function of the hand is normal (fig. 1079 to 1083)



Fig. 1082.—Actual condition of the hand of figs. 1079 and 1081.



Fig. 1083.—The hand bent. The strength and the function of the hand are practically normal.

White swelling of the wrist—multiple fistulæ succeeded the spontaneous opening of the abscess, which had not been treated (1881 and 1882).

Treatment.—In 1882, injections of camphorated naphthol into the fistulæ. In 1883, the large sequestrum shown in fig. 1079 came pointing through one of the fistulæ. We merely extracted it with forceps. In the following year,

elimination of another smaller sequestrum. Notwithstanding the elimination of the sequestra, the suppuration still continued for over 2 years. Injections of creosoted oil and of camphorated naphthol. At last, in 1906, cicatrization was complete. The cure has been maintained for the last 6 years.

To-day the strength of the hand and its functional power are practically normal.

This observation shows that there is no need to use the bistoury when a sequestrum is present; cure can be obtained without operation; for the sequestra will either be worn away by the injections or spontaneously eliminated.

The cure would not have been hastened by an operation, by the removal of the sequestrum, because, after its coming out, the cure was still delayed for 2 years; this is not surprising, for the soft tissues and the osseous parts near the sequestrum were still permeated with tuberculosis.

The only logical and complete operation would have been, here, amputation, whilst, with our method, not only could the hand be preserved, but it renders to-day, as it has done for the last 6 years, all the services that could be got out of a normal hand.

Obs. VIII.—A proof that surgical operations produce sequestra. Example of fistulæ and sequestra caused by a surgical intervention (they were cured at Berck by our conservative treatment) (fig. 1084 to 1089)

Observation VII. has proved to us that there was no necessity for an operation to remove the sequestra; observation VIII. shows that operation in itself may produce sequestra, the traumatism produced by it destroying the last means of nutrition of the affected bones, already of very low vitality. Here is the observation:

Robert P., 6 years old, underwent at Paris a surgical operation for a closed tuberculosis of the wrist: scraping of the inferior extremity of the radius. Arrived at Berck in February 1898. This was two months after the operation.

On his arrival we found: a fistulous opening (dorsal aspect of the wrist), granulations over an area of a 2-franc piece, suppuration necessitating daily dressings.

1st radiogram, on arrival (fig. 1084 and 1086).

From February to April, 10 injections of iodoform, creosote, and oil: the fistula diminished little by little and was completely closed at the beginning of April. A week after the closing, a collection on the wrist near the palm: skin red, tense, temperature 102° F.

Puncture without injection: fever subsided, but the collection re-formed: new puncture 8 days later.

Then the fistula reopened and suppurated up to the middle of June.

From April to June, 8 injections of camphorated naphthol.

2nd radiogram, on June the 5th (fig. 1085 and 1087).

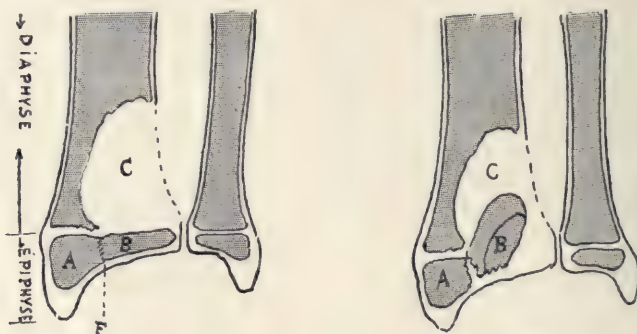
The sequestrum appeared at the orifice of the fistula on June the 16th and was easily removed with forceps.



Fig. 1084.—Radio No. 1. Tuberculosis of the wrist. Here can be seen plainly how extensively the surgeon has hollowed out the inferior extremity of the radius. The internal two-thirds of the epiphysis of the bone have bent upwards, and tend to enter the cavity left by the operation.



Fig. 1085.—The same patient. Radio No. 2. The sequestrum is becoming isolated. The greatest part of the radial epiphysis, quite necrosed, has been separated from the rest and is now placed in the upper part of the cavity made by the operation.



Explanatory schemata of Radios 1084 and 1085.

Fig. 1086 and 1087.—The operation has produced a vast cavity, C, in the lower end of the radius. The epiphysis, damaged by the operation, has been gradually separated at F (schema No. 1); its internal segment B has tipped over and has entered the cavity, where it has become a sequestrum (schema No. 2).

Two injections of oil at a week's interval; cicatrisation on June 28th. Since then the wound has remained closed (see fig. 1088 and 1089).

The function of the hand is practically normal.



Fig. 1088.—The same. Radio No. 3. The sequestrum has been discharged.

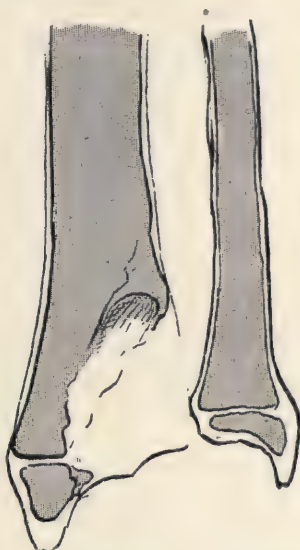


Fig. 1089.—Explanatory sketch of Radio No. 3 (fig. 1088).

The fragment of epiphysis which necrosed and had formed a well isolated sequestrum pointed through the fistula; it was easily removed. A few modifying injections were made during the following days. Two weeks after the removal of the sequestrum, the fistulous wound closed, completely and definitely.

2ND. ON THE TREATMENT OF FRACTURES

A.—Fractures of the Patella

(Refer to p. 79.)

The best treatment of these fractures, theoretically speaking, is, doubtless, to expose the seat of the fracture, to lay both fragments bare, and to perform suture, or at least screwing together of the fragments.

But what about the country doctor, suddenly called far away to an accident, the nature of which has not been specified, and finding on examination a fracture of the patella in an aged working man or peasant, perhaps alcoholic or diabetic?

Do you believe that this doctor will perform a surgical operation, wiring or screwing, in a house more or less clean (rather "less" than "more")? Would this be the best treatment to apply in such a case? Would it be wise and safe?

I have found myself in this position several times, and I have

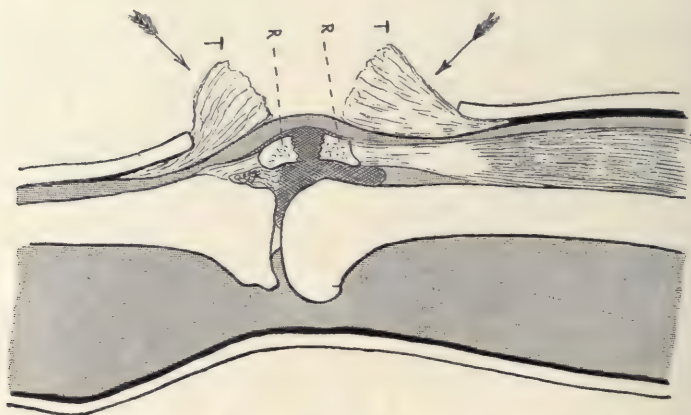


Fig. 1090.—Fracture of the patella. Treatment. The method of placing squares of wadding under the upper and lower edges of the opening in the plaster; the bandage in spica, by compressing both fragments of the patella, will bring them together in the direction of the arrows. T. tampons or squares of wadding. R. R', fragments of the patella.

applied the following treatment with very good results, without any risk to the patient. I therefore advise you to use it. Construct a plaster knee-piece from the trochanter down to the malleoli and even to the toes (see fig. 656, p. 613); 15 minutes after the setting of the plaster, make an opening on the anterior face of the apparatus, opposite the patella, this opening exposes the limb for 3 or 4 inches above and below both fragments; apply squares of wadding arranged in horse-shoe shape, between the fragments and the edge of the opening (above and below), to try and bring the two fragments nearer together; with a few turns of Velpeau bandage applied over this

tampon in the manner of a figure 8, the approximation of the fragments is easily effected and their contact is, or nearly always is, obtained.

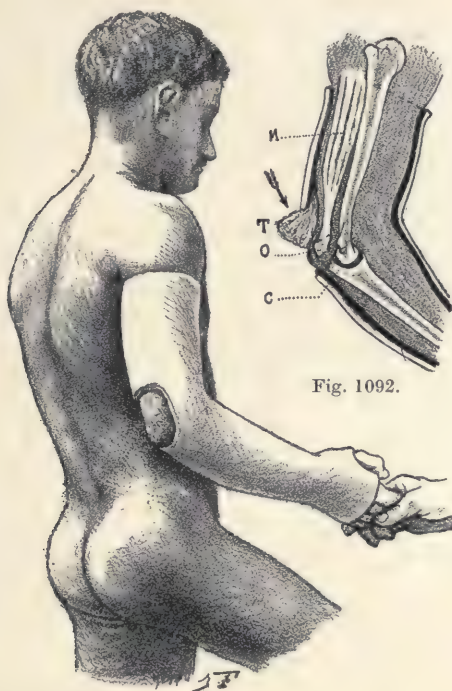


Fig. 1092.

Fig. 1091.

Fig. 1091.—Fracture of the olecranon. The apparatus. The elbow is immobilized in slight flexion (15 to 30 degrees) ; an opening is made in the plaster, on the posterior aspect of the arm, to allow of the compression with wadding of the superior fragment. This opening exposes in its lower part the point of the elbow.

Fig. 1092.—Explanatory schema of the compression : squares of wadding are introduced underneath the superior edge of the opening ; these squares project and form a pad on the superior $\frac{1}{3}$ of the orifice ; the Velpeau bandage holds them firmly and thus the osseous fragment, which was pulled upwards by the triceps, will be brought down in the direction of the arrow.—M, Muscle and tendon of the triceps, to the extremity of which the broken olecranon remains attached.—T, Tampon of wadding for compressing the broken olecranon.—O, The displaced olecranon.—C, Ulna.

Verify the compression and renew it at least once a week. After 50 days the patient may be freed from all apparatus.

By this method we have been able, in fractures with a separation of 2 or 3 inches, to reduce it to a few millimetres. And the functional result has been perfect, or nearly so.¹

B.—Fractures of the Olecranon

(Refer to p. 79.)

In the same way we can treat fractures of the olecranon by a plaster apparatus, opened at the region of the fracture, and allowing of a wadding compress which brings the superior fragment in touch with the inferior one.

It will be sufficient here to make pressure on the upper fragment only; but it is safer to place a pad of wool between the inferior fragment and the edge of the plaster, to prevent sores.

Theoretically, it seems preferable, to ensure the contact of both fragments, to plaster the limb in complete extension; but in complete extension the wadding compression would be ineffective. **All things considered**, we prefer to flex the limb slightly, as is shown in fig. 1091.

Here again we have obtained very good results by the adoption of this treatment.

C.—Fractures of the Neck of the Femur. A practical and safe treatment

(Refer to p. 79.)

Of all the fractures of the limbs, none, I think, give more trouble and less satisfactory results than fractures of the neck of the femur.

Generally they are treated by Hennequin's or Tillaux's extension.

But this extension, to be effective, must be well done and carefully watched over, which is here difficult; but above all, whatever is done, it is too often inadequate in giving us a good result. Indeed, if the fragments are displaced and impacted (see fig. 1106), extension can do nothing. And if impaction does not exist, if the fracture is very complete (see fig. 1108) extension does not succeed in

¹ Among many others, I can mention the case of an old alcoholic beggar woman, picked up drunk in the street; I found a fracture of the patella with a gap of two inches between the fragments.—And two months afterwards with this treatment she could walk without any assistance.

Here is another example: an ecclesiastic 72 years old who, a year after a fracture of the patella (treated by us), could fulfil his duties and even kneel down.

correcting exactly the different factors of deviation, especially the shortening, often very marked, and the external rotation of the inferior fragment, always so intractable, the results of this method of treatment are in the end very poor and even frankly bad.

Lastly, the treatment by extension is unfit for many patients, for all those whose great age or bad visceral conditions prevent them from maintaining for so many weeks the recumbent position.

From all this, one understands that fractures of the neck of the femur (which unite so badly when they unite at all) are the scarecrow of practitioners. And this is why I would like to mention the simple



Fig. 1093.—Normal hip-joint.

and practical treatment that I have applied for several years and which gives infinitely superior results to those obtained by extension.

It can be applied in all the anatomical and clinical varieties of fractures of the neck; extra or intra-capsular, mixed fracture, or epiphysial detachment (see fig. 1093 to 1100).

A Word upon Diagnosis

Epiphysial displacement is often mistaken at its onset for hip disease and, later on, after the union of the bone, for coxa vara. Deformities following other varieties of fractures of the neck may also be mistaken for coxa vara.

But the diagnosis between a detached epiphysis and commencing hip disease is easy, as, besides the indications furnished by the X-rays, which always show distinctly the detached epiphysis, there is the history of a traumatism, and an appreciable shortening of the affected limb is always noticeable; whilst in hip disease at the onset, on the contrary, the affected limb is slightly longer than, or at least as long as, the sound one.



Fig. 1094.—Different varieties of fractures of the neck of the femur; 1, epiphysal detachment; 2, intra-capsular fracture; 3, extra-capsular fracture; 4, trans-trochanteric fracture; 5, sub-trochanteric fracture.

As for the diagnosis between coxa vara and a badly united fracture, in the latter is a history of traumatism and a sharp notch on the superior edge of the neck noticeable by the X-rays, on the seat of the fracture.

And yet I have known cases where this mistaking an old detachment of the epiphysis for a coxa vara has been made by surgeons who had radiographic installations at their disposal.

Nevertheless, the diagnosis is easy, for one has only to remember that the direction of the external portion of the neck is obliquely

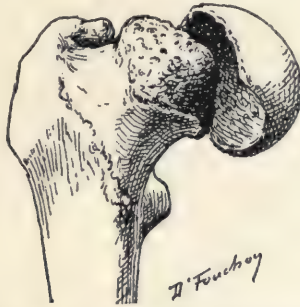


Fig. 1095.—Detachment of the epiphysis.

outwards and upwards and that the trochanter is much hypertrophied



Fig. 1096.—Respective position of the fragments in an intra-articular fracture (from a radio).

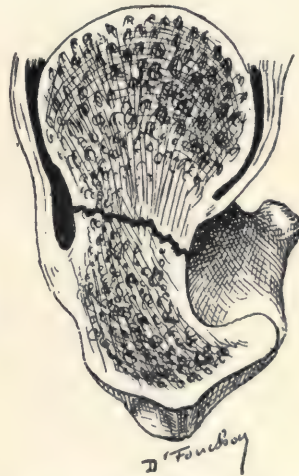


Fig. 1097.—Mixed fracture—intra and extra-capsular.

in the case of coxa vara (fig. 1101), whilst there is obliquity downwards and outwards of the external fragment of the neck, without

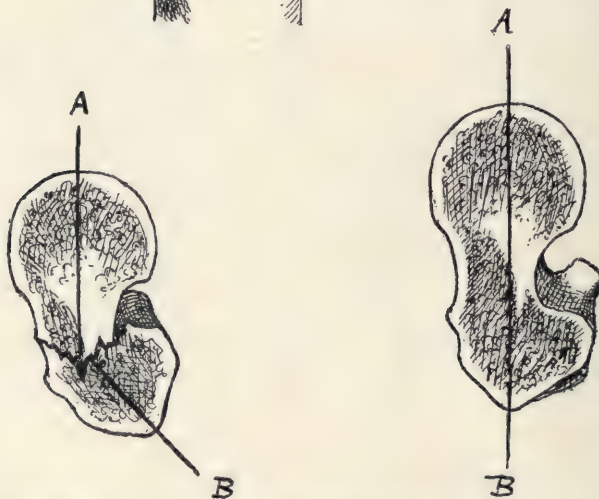
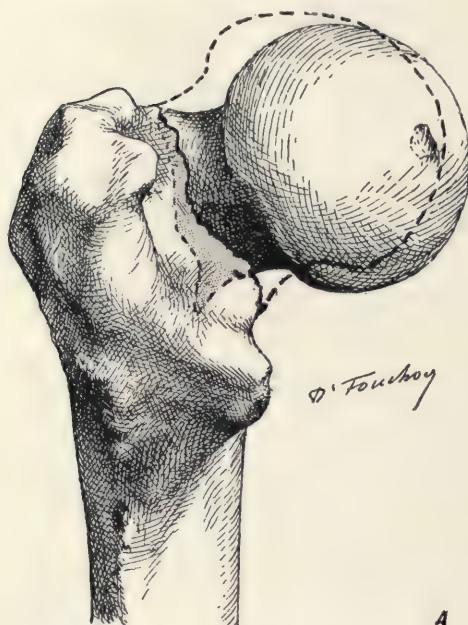


Fig. 1098, 1099, and 1100.—Extra capsular fracture with impaction of the fragments. The spur of Merkel penetrates into the spongy mass of the trochanter and may even split it; the axis of the neck forming a broken line at an angle with the digital fossa.

hypertrophy of the trochanter, in cases of detachment of the epiphysis or of badly united fracture (see fig. 1102).



Fig. 1101.—To establish the diagnosis between “essential” coxa vara and a badly united fracture of the neck. — 1. Here (fig. 1101) is an essential coxa vara. The whole of the neck has given way; its superior border is oblique, downwards and inwards. The dotted lines show the normal position of the head (see fig. 1102).



Fig. 1102.—2. Traumatic coxa vara. The epiphysis only has slipped down: the superior border preserves its direction upwards and inwards (see fig. 1101).

As to the **immediate** diagnosis of fracture of the neck, it is **generally** easy. You are called to a patient who, after a severe fall,

has been unable to get up, and complains of his hip. He is generally an old person. You find the lower limb in external rotation and shortened by 2, 3, 4 cm., a shortening easy to ascertain, if you compare the respective levels of the two heels.

It is at once apparent that there is no fracture of the leg, nor of shaft of the femur; you notice also that there is no luxation of the hip, the head of the femur being well in its place, at the fold of the groin, beneath the artery (see p. 724, fig. 780-1, for the diagnosis of luxation of the hip).

The trochanter is, however, as in luxation, displaced above Nelaton's line.

It is a fracture of the femoral neck; moreover, you will generally feel the characteristic crepitus and an abnormal mobility between the fragments. Nevertheless, there are cases where the diagnosis is difficult, as in fractures of the neck following a relatively slight traumatism, and also in cases where the patient has not only been able to get up but even to walk, and to walk for a certain length of time. Such cases have been known, exceptionally, it is true, in adults, but oftentimes in children (for example, the patient in fig. 1111), and even when the fracture was *not* impacted. You must bear these cases in mind, so that, on noticing the possibility of walking in a patient suffering from the hip, you do not come to a rash and definite conclusion that there is no fracture of the neck. So that, in such cases (after a traumatism of the hip), you will have to look for signs of epiphysial detachment or of fracture of the neck—always possible. If you can use the X-rays, the diagnosis will be very easy, but, failing the X-rays, you can come to a decision by exercising more attention and carefulness in your examination of the hip.

Outline of the Treatment.

It consists simply in doing for fractures of the neck of the femur¹ what we do for an ordinary fracture of the limbs, namely, immediate reduction (with or without chloroform) followed by the exact maintenance of the reduction by means of a large plaster (exactly similar to the large plaster for hip disease). With this apparatus the patient keeps at rest in the recumbent position, if that is not detrimental to his general health (as is the case in children, adolescents, and adults); but he may also stand and walk with the help of crutches

¹ And also for fractures of the shaft of the femur.

if a prolonged decubitus presents danger to him (as in aged persons, and in certain emphysematous and cardiac adults). Note at once that the thigh must be plastered in abduction of 30° to 45° , for this marked abduction facilitates greatly the immediate maintenance of the reduction, and the good function of the limb afterwards.

This "large plaster" (reaching from the waist to the toes) is to be worn for 7 or 8 weeks. After this time it is replaced by a "small plaster" reaching from the waist to the knee only (applied

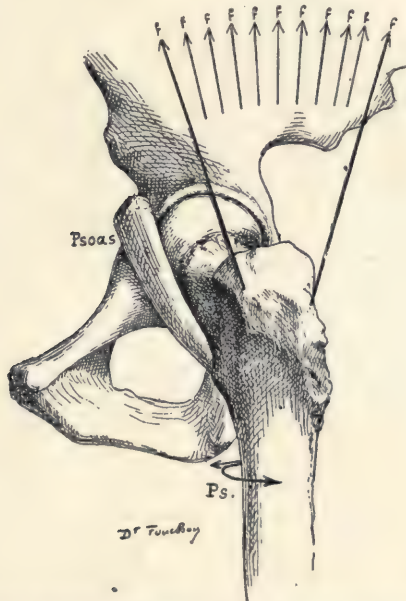


Fig. 1103.—Schema showing the action of the muscles: the glutei muscles pull the trochanter upwards, the psoas and the obturators and gemelli produce external rotation.

in an abduction reduced by half)—with which the patient can walk, resting on his foot. After 5 or 6 weeks (altogether 3 or 4 months in the plaster) the patient is freed from all kind of apparatus. There is then no more to be done, except massage and walking exercises, than after an ordinary fracture of the leg.

On the whole, it is an easy treatment, possible for every one, as all doctors know how to set a fracture, and as all know to-day how to construct a plaster for hip disease. (There will be found, p. 416

to 429, a full explanation, illustrated by figures, of the different stages of the technique and of the construction of the plaster.)

This said, let us enter into the details of the treatment of fractures of the neck of the femur.

1ST. Reduction

Reduction, as in other fractures, can be effected without the use of chloroform, although, of course, by using it your work would be greatly facilitated, and at the same time your patient would be spared all pain. If, then, neither you¹ nor your patient² have good reason for avoiding chloroform, use it.

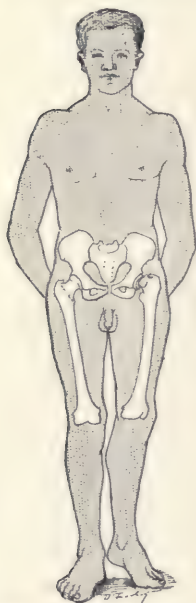


Fig. 1104.—Shortening and external rotation in intra-capsular fracture of the femur (left).

The Manœuvres for Reduction.

The direction of the manœuvres to be performed is decided by the direction of the existing deviation and by analysis of the several factors of the deviation (see fig. 1103 and 1104).

We must correct :

- (a) The shortening ;
- (b) The external rotation ;
- (c) The abduction.

To do this, we shall have to pull on the leg and thigh, and to carry it into internal rotation and abduction (abduction of 25° to 40° , as we have said).

Traction.—If it is to be really effective and accomplish reduction, we must first immobilize the upper fragment, *i.e.* the pelvis ; otherwise, both fragments will be pulled downwards at the same time by the traction exercised on the affected leg, and we run the risk of not correcting the abnormal relative position of the fragments.

To obtain fixation of the upper fragment, proceed in this way :

The patient being held under the arms by one or two strong assistants (not necessarily medical men), another person pulls strongly

¹ That is, if you have the assistance of a colleague knowing well how to administer chloroform (see this technique, p. 102)

² That is, if he is not too old, nor too fat, nor too emphysematous, nor a confirmed cardiac.

upon the sound leg downwards and outwards, in an abduction of 40° or 50° . The purpose and the effect of this manœuvre is to lower this side of the pelvis of the patient and, consequently, to raise, by a see-saw movement, the affected side of the pelvis, as well as the upper fragment of the fracture; at least it prevents the upper, or rather, internal fragment, from being lowered at the next stage, when the affected leg will be pulled on to reduce the fracture.

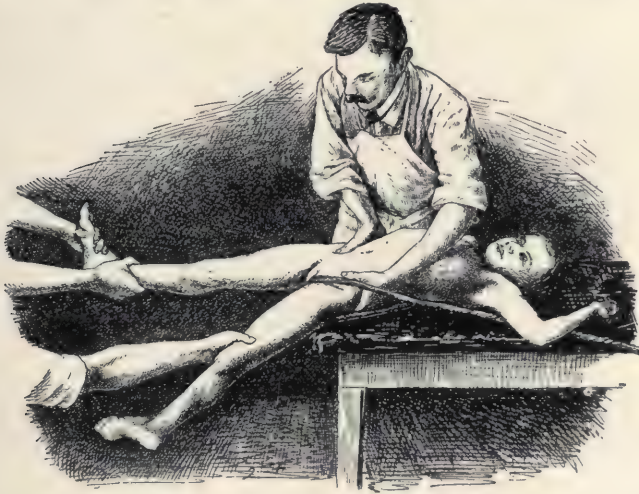


Fig. 1105.—Manœuvre for correcting a fracture of the neck of the left femur. The affected leg (left) is brought into abduction, internal rotation and hyper-extension. (Traction performed on the right foot ensures counter-extension). Thus (the patient lying on his back) counter-extension is effected: 1st, by the assistant pulling on the sound foot; 2nd, by another assistant immobilising the pelvis; 3rd, by a hank of wool placed in the fold of the groin on the affected side. The correction is effected by the surgeon pulling on the affected foot and knee; he brings the femur into abduction, internal rotation and hyper-extension, and thus gives it an inverse position to that which the traumatism had produced, as illustrated in fig. 1104.

Again, and with this same purpose of fixing the upper fragment, a second assistant pushes in an upward direction against the ischium of the affected side; or, better, you may pass the loop of a hank of wool round the ischium and the upper fragment, the other end of the hank being fixed to the head of the bed or to a table (see fig. 1105).

Then only do you proceed to reduce the fracture, whilst another strong assistant pulls on the foot and leg of the affected side.

He must pull firmly downwards and outwards (up to 30° , 40° or 50° of abduction) imparting to the foot a movement of internal



Fig. 1106.—Correction in the case of impaction of the fragments. The affected femur has been placed in flexion, then in abduction: this movement is limited; the head and neck are jammed against the posterior border of the acetabulum. On the right, the sound side, forced abduction.

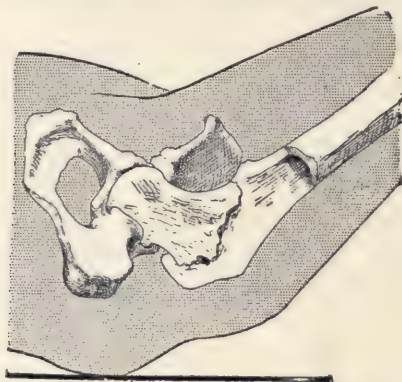


Fig. 1107.—Position after reduction—by forcible abduction the impaction is undone.

rotation to correct the existing external rotation, whilst you yourself, placing one hand upon the trochanter, will see that the reduction is

effected ; you aid this by pressing upon the trochanter with one hand, whilst the other bears upon the affected knee to accentuate the correction of internal rotation and abduction.

As soon as reduction is obtained, you control and verify it again by direct palpation of the hip ¹ and by very exact and, if need be, repeated measuring of the thigh : the measuring tape being stretched

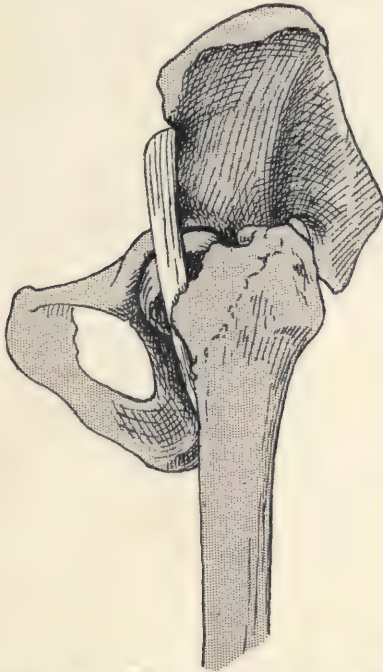


Fig. 1108.—In extension, the cord formed by the psoas glides into the interstices produced between the neck and the head of the femur, gaping in front ; these muscular fibres are an obstacle to the approximation when reduction is attempted by direct pulling on the leg (fig. 1109). In certain fractures with much shortening, there is an interposition of soft tissues between the two fragments.

from the iliac spine to the apex of the patella on both sides, alternately, whilst both legs are maintained symmetrically, in the same degree of abduction.

Two remarks about reduction : (a) When it is a case of fracture

¹ Or better still by radioscopy or radiography, when it is practically possible.

with impaction of the fragments (when the fracture is generally incomplete), it is better not to pull too hard and to avoid a violent separation of the fragments. No, one must pull, twist, and manœuvre, only as much as is necessary to obtain a complete correction of the existing deviation, going, it is true, up to a certain degree of hyper-correction.

One must then only perform the manœuvres necessary for placing the knee in an internal rotation of 10° to 15° and in an abduction of 25° to 30° .



Fig. 1109.—In this case (see fig. 1108), to reduce the fracture, it is sufficient to flex the thigh to a right angle; by this movement the psoas, drawn away by the small trochanter, leaves the line of the fracture. After this, the thigh is brought into extension and abduction.

This is a good manœuvre for undoing impaction of the fragments (see fig. 1106 and 1107).

(b) When, on the other hand, it is a case of a very complete fracture, with a very marked gap between the fragments and a very noticeable shortening, 3 cm. or more, when one feels (by palpation) the trochanter and the lower (or rather external) fragment above and in front of the femoral head, the fragments being often separated by the fibres of the capsule or of the muscles, reduction can only be obtained by direct traction of the thigh in extension (see fig. 1108 and 1109).

You must begin by flexing the thigh, reaching sometimes 90° ; this will relax the soft interposed fibres, liberate the fragments and allow you to succeed in replacing the lower (or external) fragment of the neck in contact with the upper (or internal) fragment.

You verify by palpation that the coaptation of both fragments is obtained, after which, whilst you maintain it with one hand, with the other you carry the knee 45° outwards, until you feel you are stopped



Fig. 1110.—The large plaster for the lower limb, to be applied as soon as the fracture is reduced. The apparatus allows of walking with crutches (in patients who could not, without danger, remain continually and for many weeks, in the recumbent position).

by the assistant who pulls on the leg and the foot. It is especially in such cases that you have to carry the thigh as far as possible outwards, up to 45° , until you feel you are stopped by the contact of the upper surface of the neck of the femur with the upper edge of the margin of the acetabulum (this happens at or about 45° of abduction); this position is very favourable, as we have said, for the exact maintenance of the reduction.

2ND. Maintenance of the Reduction. Immobilisation

The reduction being obtained and maintained (all your assistants retaining their position as indicated above), you begin to construct the plaster which must accurately preserve the reduction. It requires, let us repeat it, a large plaster as for coxitis, such as all



Fig. 1111.—Gaston D., 15 years old. Radio, showing the fracture which has completely separated the head from the femoral neck ; the broken face of the neck faces forward, perpendicularly to the broken face of the head (note that this patient had not ceased walking for a single day, and that he came to us 7 months after the fall which must have caused the fracture ; and lastly that he came with a diagnosis of hip disease).

practitioners can easily make by following the technique already explained and illustrated in this book, and which it is, therefore, unnecessary to describe again here (see fig. 1110).

As soon as the last strip is applied, and before the plaster has set, the patient is gently removed from the pelvic support and carefully placed on the table, whilst your assistants still maintain the given

position. Place one hand on the seat of the fracture to ensure (through the plaster) its exact reduction, embracing the plaster above the trochanter with the half-opened hand, whilst with the other, placed on the knee, you make certain of its good position, increasing or diminishing as the case may be, the abduction and rotation already obtained.

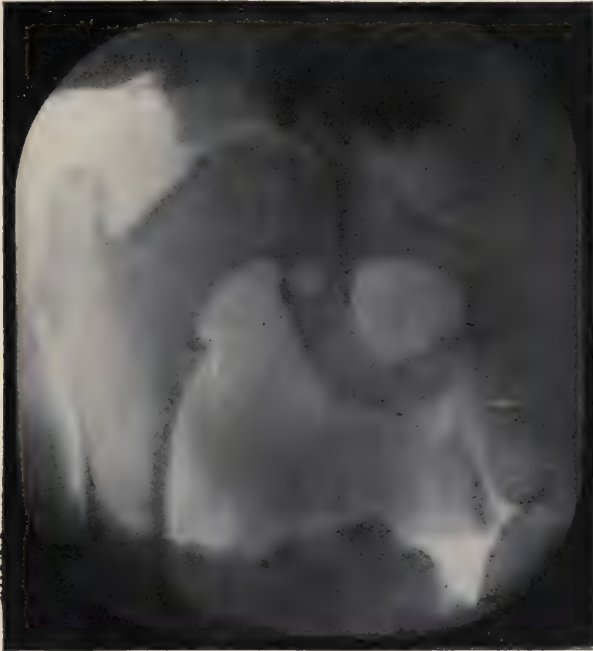


Fig. 1112.—The same child, 5 weeks later ; radio taken through an opening in the plaster. The image is very like the one of a normal femur in internal rotation. Functional and anatomical cure perfect ; the cure is all the more remarkable seeing that the fracture had been ignored and left wholly unattended for 7 months.

The plaster is modelled above the iliac crests and inside the iliac spines, and on a level with the ischium (as represented on p. 430 and 432).

You and your assistants will keep your places until the plaster has set. Then you have only to free the plaster round the waist, the genital organs and the toes, as you know.

One more remark on the construction of the plaster. It is easy to construct a plaster on a thin patient, but it is not so easy on a stout or fat subject ; however, with the expenditure of more time and care you will succeed.

And the benefit to be derived from the plaster is too great to be dispensed with in any case.

Perhaps you will object that several assistants are necessary to apply this treatment for correction and extension. But, I repeat, those assistants need not be surgeons ; you can employ any of the



Fig. 1113.—Tracing from radio of fig. 1111 (we give this tracing in order to render the lesion more clear to all).

friends of the patient ; you can easily explain to them what they have to do.

In reality the treatment is simple, at least in the majority of cases ; nine times out of ten all goes on well with the reduction and application of the plaster. When the plaster is applied, everything is finished.

The plaster will produce about 3 months later a perfect anatomical

cure and a good functional result or nearly so. As I said, you can assist it with massage, exercises, baths, etc.

The case here illustrated (see fig. 1111 to 1114) of a fracture of the neck in a young man 15 years old, is an example, among many others, of an ideal cure obtained by the treatment I have just explained.

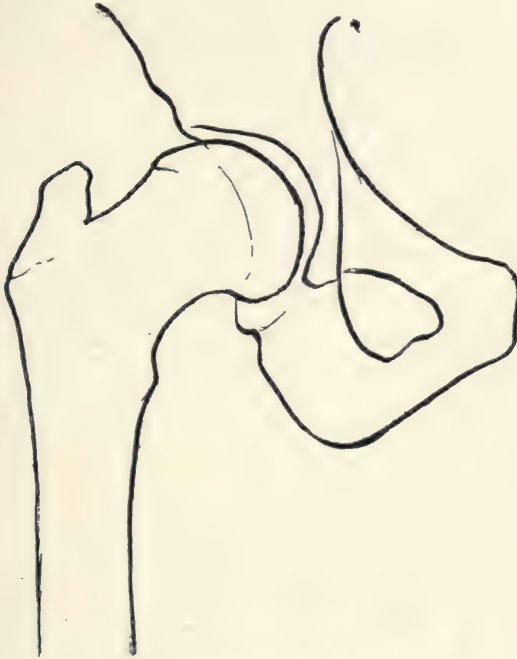


Fig. 1114.—Tracing from radio of fig. 1112.

All that has just been said refers to **recent** fractures of the neck of the femur.

Treatment of OLD Fractures of the Neck of the Femur

1ST CASE. The fracture is already united, but the functional result is bad

A patient (whose fracture of the neck dates a few months or a few years) comes to you because he is very lame; you notice a marked shortening and a strong deviation of the leg in external rotation and

abduction. He asks if you can do anything for him. Yes, you can correct the shortening and the bad position and, consequently, the lameness.

Proceed with the examination of the patient, under chloroform if possible. The pelvis being firmly held by two assistants, one of whom keeps the sound thigh bent on the abdomen, the other fixing the iliac bone of the affected side (one hand grasping the iliac wing and the other the ischium), you try to separate the two fragments of the fracture by alternate movements of flexion and extension of the thigh.

(a) It happens indeed, in certain cases, that the union being not very firm, the two fragments may be thus separated, which you will easily perceive by direct palpation of the neck; you will notice a certain amount of mobility and crepitus produced by the friction of the two sundered fragments of the bone.

As soon as mobility is produced, bring the femur into the correct position or, rather, into hyper-correction, that is, into internal rotation and marked abduction.

Then you fix the correction with a plaster of the same pattern and for the same length of time as for a recent fracture.

Here also, with the plaster, the patient will be kept at rest or will be allowed to walk as in the cases specified in our study of recent fractures.

(b) But, if you have not succeeded in loosening the fracture after 5 or 6 vigorous movements of flexion and extension, do not persist; have recourse to a slight osteotomy to induce the breaking of the bone at the level of the old fracture; I say slight, because it affects only half or two-thirds of the thickness of the bone, the remaining being broken by osteoclasia. This also is slight; it should be subcutaneous and hardly any hæmorrhage will occur; all patients will bear it well.

I have done this a dozen times for badly-united fractures of the neck which had left lameness or grave disability, and I have obtained each time a perfect anatomical and functional result, or nearly so.

The Technique of Linear Osteotomy of the Neck

On what part of the bone would you perform this?

At the level of the fracture, or, more simply, above and inside the great trochanter, close to it, on the most external part of the neck.

In what direction? Not exactly vertically, but obliquely inwards and downwards; the osteotome will follow closely the direction of the line bisecting the angle formed by the shaft of the femur and the neck, or, in other words, you will direct the osteotome towards the middle of the internal aspect of the thigh (see fig. 1115).

The patient lying on his sound side, you mark the superior edge of the great trochanter, and above, and quite near it, you make a vertical cutaneous incision of 1 cm. or $1\frac{1}{2}$ cm. barely. Introduce the osteotome parallel with the incision and drive it in until you touch the bone.

Then you twist the osteotome transversely, that is, perpendicularly to the axis of the neck, and you direct it, as I said, towards the middle of the internal aspect of the thigh.

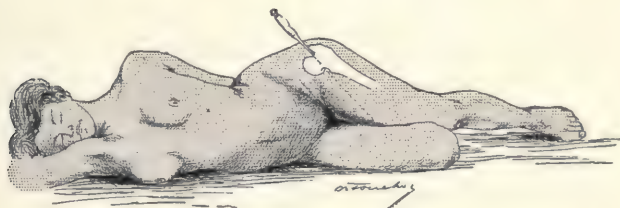


Fig. 1115.—The technique of linear osteotomy in badly-united fractures of the neck. This illustration shows the direction to be given to the osteotome. The osteotome is held by the surgeon in such a way that its direction prolonged would reach the middle of the internal face of the thigh. Two-thirds of the thickness of the bone only are cut by the osteotome. The remaining third is broken by osteoclasis (see following figure).

With the mallet, you drive it in up to the centre or to two-thirds of the thickness of the bone, which you reach after two or three blows in a child, and five or six in an adult. With a graduated osteotome, you easily estimate what depth you have reached.

It is very easy to avoid the crural nerve and the femoral vessels in front, and the sciatic nerve behind, to do which, be careful not to lose contact with the bone with the cutting extremity of the instrument, and do not let it incline forward or backward, that is to say, maintain the superior and inferior edges of the osteotome in a plane parallel with the plane formed by the axis of the shaft and the axis of the neck (see fig. 1116).

As soon as you feel (or see on the graduated osteotome) that you have reached half the thickness of the bone, you withdraw the osteotome and place a dressing over the small cutaneous incision;

then you perform osteoclasis, to effect the breaking (which has been facilitated by the osteotomy).

To perform osteoclasis, the pelvis is held firmly by one or two assistants, and the thigh is brought into strong adduction by another assistant, as if one wished to exaggerate the present deviation. Persist vigorously until you hear creaking; then, at once, you bring the thigh into the opposite position of abduction, of about 30° , and internal rotation, that is, into hyper-correction.

There is no need to suture the insignificant skin incision.

Immobilisation in this position in a large plaster, and with this apparatus rest or walking, according to the case. The subject may leave his bed a few days after this very slight intervention.

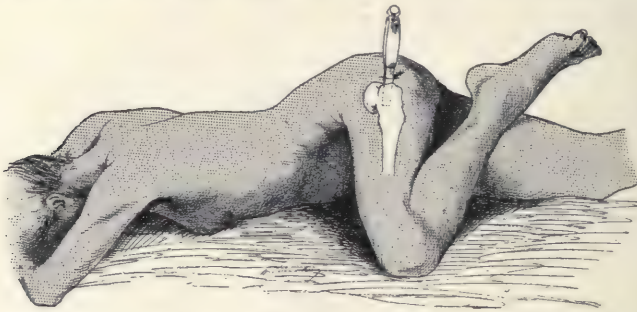


Fig. 1116.—The technique of linear osteotomy (*continued*). The direction of the osteotome above downwards is that of the axis of the shaft (the superior and inferior edges of the osteotome remain parallel to the plane defined by the axis of the shaft and that of the neck of the femur).

2ND CASE. The fracture of the neck of the femur is not united

A patient comes to you 6 months, 1 year, 2 years, after fracture of the neck has occurred.

He has a pseud-arthritis, he suffers pain, he is helpless, and asks if his condition cannot be improved.

(a) First of all, endeavour to obtain solid union after having made a **non-surgical refreshing** of the fragments. To effect refreshing, take hold of the thigh, the pelvis being fixed, mobilise the two fragments for several minutes, or, rather, rub them one against the other, after which you secure them in a plaster. And it happens, when the fracture is recent (of less than one year) that osseous union is thus obtained. I could give several instances.

You wait for union for 4 or 6 months. But at the end of this time, if it is not effected, you can no longer hope for it.

What will you do then ?

Surgeons **who favour operation in cases of fractures** will suggest either the resection of the head, or the surgical erasion of the two fragments, followed by continuous extension according to Hennequin's method.

But these operations are very severe (which was not the case with the slight osteotomy mentioned above) and, moreover, their benefit is very uncertain. Indeed, the resection of the head is bound to yield a very indifferent orthopædic result and even a very marked lameness ; we can succeed better, as we shall see, with a non-surgical treatment.

As to the value of the surgical refreshing followed by continuous extension, and the value of pinning, without wishing to ignore them, I will give two striking examples which came under my notice, of patients operated upon in Germany ; they will show that one must not expect too much from these operations.

The first patient, a Portuguese, underwent pinning of the two fragments. At his second walking exercise, the pins broke, he relapsed, and would not hear of a new operation : he remains a confirmed invalid, with those two foreign bodies still in his femur.

The second patient, a Frenchman, 30 years old, was also treated by pinning of both fragments, under Hoffa, but after the operation he suffered great pain and walked very badly. I was able to ascertain that there was no union, and that both fragments were playing one over the other, notwithstanding the presence of the pins. For this reason he insisted on the removal of the pins. This was effected by a surgeon of one of the hospitals at Paris, who then refreshed the fragments by the open method ; after that, the patient had continuous extension, instituted and superintended by Hennequin himself.

But the hoped-for union was not effected after this rather severe surgical treatment.

Then what is to be done in such cases ? Well, I do not hesitate in advising you not to have recourse to resection of the head and refreshing ; such operations ought, if they must be done, to be left to surgeons who are specialists in fractures—but need they be performed ? for myself I do not believe that these surgical treatments are to be preferred to the simple non-surgical method which I am going to describe.

This method consists in an anterior replacement of the inferior fragment of the fracture by manœuvres similar to those we orthopædic surgeons perform for congenital luxations of the hip of old standing, when we merely wish to better the position of the femoral head and give it a bony resting point in front, without seeking real reduction. In the case of fracture, you leave the upper fragment where it is, but you carry the thigh in hyper-extension, abduction and internal rotation, so as to afford the lower fragment a good solid support on the pelvis in front.¹ And thus you will obtain a functional result superior altogether to that obtained by surgical methods, and without any of the risks involved in those methods.

Summary and Conclusions

In a word, this is what must be, in my opinion, the treatment of fractures of the neck of the femur :

1st. *For recent fractures* : Correction of deformity and placing the limb in an abduction of 30° to 45° , with internal rotation of 10° to 15° . After that, immobilisation in a plaster (as for coxitis) with which young and healthy patients will remain in the recumbent position, and with which old patients will be allowed to stand and walk with the help of crutches.

2nd. *Old Fractures with Loss of Power.*

A. If union is already produced :—

(a) One endeavours to undo it by the non-surgical mobilisation of the two fragments ; one replaces the limb in good position and in a plaster . . . rest, or walking, according to the case.

(b) If the attempt at mobilisation does not succeed, subcutaneous supra-trochanteric osteotomy ; partial osteotomy of two-thirds of the thickness of the bone, followed by rupture (osteoclasia) of the other third ; after that, placing in good position and in plaster.

B. If the fracture is not united :—

(a) Mobilisation, to try to obtain a refreshing (by non-surgical means) of the two fragments, then immobilisation in a large plaster.

(b) If this attempt at refreshing followed by 4 months in a plaster has not succeeded, instead of performing a surgical operation, always grave and often useless, one will be content with carrying the femur

¹ You will find all the details of this technique on p. 816 and following.

into an hyper-extension¹ and an abduction of 45° so as to give the lower fragment a good support on the pelvis in front. With a plaster the patient is allowed to walk. After 3 or 4 months in this position, the thigh is carried back in an abduction of less than 15°, maintained by a second and last plaster worn for two or three months.

With the above treatment, you will easily cure recent fractures of the neck of the femur. As to old fractures which have left a useless limb, you may obtain notable improvements, or even cures, and this by simple methods (which you may be assured will never occasion any harm); one cannot say as much for surgical methods² practised in fractures of the neck of the femur.

¹ Of about 15°.

² Here are the statistics of two surgeons (the two who have had, perhaps, the greatest experience) in cases of fractures of the neck of the femur.

(a) Lambotte, of Antwerp: out of 20 patients operated upon by him (screwing of femoral head) 3 are dead, 1 of pneumonia, 2 of infection;

(b) Pierre Delbet, of Paris: out of 26 patients operated upon by him (pinning) 4 died from incidental causes.

Look at the mortality,—more than 15 per 100. As to the functional results?

ON COXA VARA

Its Diagnosis and Treatment

(What all practitioners ought to know)

THE question of coxa vara is of interest to all practitioners, as you will see presently.

1st Case. Most of you have been consulted as to children 2 or 3 years old, who “*duck*” in walking. Do you know what is the matter?—A bad habit?—No. A muscular weakness which (according to its form) may disappear with growth?—No.

It can be only one of two things; congenital luxation of the hip or . . . *coxa vara*.

2nd Case. An adolescent (12 to 20 years) “*ducks*” or “*waddles*” in walking (on one or both sides); here again it is a congenital luxation or *coxa vara*.¹

3rd Case. An adolescent comes to you for lameness or for pains² in the hip or the knee; you think of hip disease; and indeed, most often it is that, but not always; it may be a *coxa vara*.

In these three cases you must then think of a possible *coxa vara*, and know how to frame its diagnosis and its treatment, for you may well imagine that the treatment will be entirely different according as it is a case of *coxa vara* or of luxation, and you would not be forgiven for such an error of diagnosis and treatment. You can avoid this error, thanks to the indications given on pp. 629 and 643.³ We wish to add just one word about the diagnosis of hip disease and *coxa vara*. There is one case where this diagnosis is nearly impossible

¹ Nevertheless, the double oscillation of the trunk during walking could also be caused by a progressive muscular atrophy arrived at an advanced stage, but the diagnosis, in this last case, presents no difficulty.

² Why, you will ask, are there pains and contractures in *coxa vara*? For the same reason that there exist painful muscular contractures which complicate cases of flat foot in adolescents.

³ See p. 1031 for the diagnosis of *coxa vara* with deformity as a sequence of a fracture of the neck, united in a bad position (fig. 1101 and 1102).

without the help of radiography ; it is the case of an adolescent who has been slightly lame, and has suffered at intervals for more than a year when first brought to you.

What renders the diagnosis very difficult is, that hip disease of over a year's standing generally produces shortening, and the trochanter may thus be above Nelaton's line : such a coxitis imitates exactly a coxa vara.

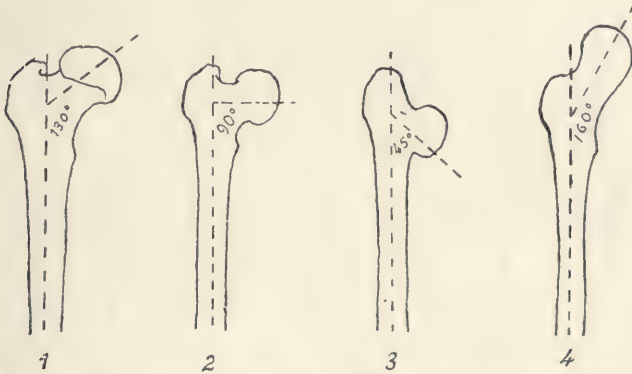


Fig. 1117.—*Normal femur*. The axis of the neck forms with the diaphysis an open angle (below) of about 130 degrees.

Fig. 1118.—*Coxa vara* (medium gravity). The angle formed by the neck and diaphysis is a right angle.

Fig. 1119.—*Coxa vara* (very grave variety). The angle formed by the neck and diaphysis is of 45 degrees only.

Fig. 1120.—*Coxa valga*. The angle formed by the neck and diaphysis is of 160 degrees instead of 130 degrees, the normal angle. It is more rare than coxa vara and is often due to infantile paralysis, whilst coxa vara is rather due to rickets.

Clinical observation gives, it is true, the signs of presumption for making the diagnosis (and you know them),¹ but the sign of absolute certainty must be sought for by radiography.

Prognosis and Therapeutic Indications

What will become of the defective gait and functional trouble of coxa vara if they are not attended to ?

(a) *In very young children* they have been known to disappear spontaneously ; but you must not rely upon that, and it is your duty

¹ If there is a pulpy thickening round the hip, it is hip disease ; if the parents can affirm that the affected limb began by being longer than the other one (before becoming shorter) it is hip disease, etc.

to treat the deformities like other rickety deformations—namely:—
1st, by the general and dietetic treatment of rachitis, which you know : milk diet, sojourn in a good climate, if possible at the seaside ;
and 2nd, by local treatment consisting of rest and continuous extension of from 1 to 2 kilos. in abduction of 25° of the affected limbs.



Fig. 1121.—Left unilateral *coxa vara*. Shortening, position in adduction and external rotation.



Fig. 1122.—The gain to be obtained by cuneiform osteotomy (see text, p. 1070) is here made evident.

This treatment is nearly always sufficient to cure *coxa vara* in very young children, and to cause after 1 or $1\frac{1}{2}$ years, the “ducking” and “waddling” to disappear.

Keep to this, then, at least at the beginning, in nearly all cases.

One must reckon 1 or 2 years on an average, to obtain this functional cure. If it is not sufficient, you apply the following orthopædic

treatment (you will even apply it from the beginning in grave forms of coxa vara, so as to gain time and make certain of the result) : you place the thigh, or both thighs, according to the case, in internal rotation of 15° to 20° and in forced abduction of 45° , performing, if need be, to produce this abduction, the stretching, or rupture, or section, of the adductors of the thigh,¹ and you maintain this forced abduction for 3 months with a large plaster for the hip ; after 3 months do away with the plaster ; but the young patient must still keep at rest for 2 or 3 months, during which the leg returns spontaneously to the normal position. After that, let the patient stand and walk, consequently 5 to 6 months of treatment altogether.

(b) *In adolescents :*

Here again it has been said : the lameness and pains will pass off of their own accord, they will disappear at the end of the period of growth ; patience, then, let us wait for that time.

And it is true sometimes, but not always, far from it in serious cases (in the same way that tarsalgia, scoliosis, or genu valgum in adolescents, do not always disappear spontaneously at the end of growth). You are obliged then to apply a direct treatment to the deformity. This is what you do for the several cases :

(a) *In slight forms* (slight as regards lameness and functional troubles), you order rest and make continuous extension of the leg in an abduction of 20° to 25° , for 5 or 6 months.

(b) *In cases where lameness is more marked*, you will apply the orthopædic treatment given above (abduction and large plaster).

(c) *In cases of severe lameness and functional troubles*, you must seek for cure by surgical treatment.

In such cases, orthopædic treatment no longer suffices. Nevertheless, this is not absolutely so, and, if you are not too much pressed for time, you may try it, remaining at liberty, in case of failure, to have recourse to a surgical operation. I could give you instances of cases of very marked lameness with grave anatomical deformities, where the surgeon had suggested at the onset, as the only resource, an osteotomy, which the parents had firmly refused, owing to their fear of all kinds of surgical operations ; they had asked the surgeon to

¹ See for details of these several techniques the chapter on hip disease, p. 446 and following.

apply exclusively orthopædic treatment. Well, that treatment sufficed in those patients to procure the functional cure (*i.e.* it cured the lameness) without succeeding, it is true, in obtaining an anatomical cure; but is not, after all, functional cure the only cure that interests the patients and their parents?

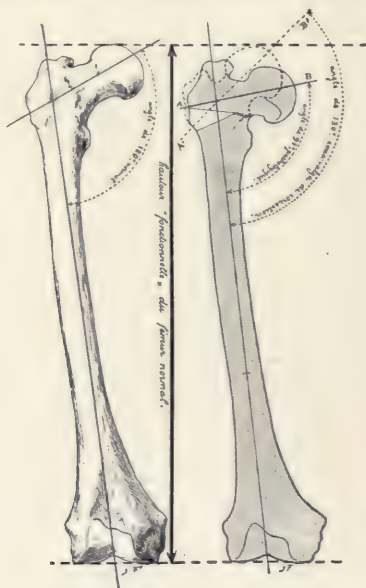


Fig. 1123.—Normal femur. Its functional or effective height is measured from the highest part of the surface of the head down to the middle of the interline of the knee.

Fig. 1124.—Femur and *coxa vara* of traumatic origin. A B, axis of the neck after the traumatism; the angle of the neck with the diaphysis measures only 95 degrees instead of 130; there has been a bending or closing of the two points of the compasses; hence, functional shortening. The cuneiform resection of the bone allows of opening the two points, to give them a greater widening. The axis of the neck takes then the position A' B' and forms an angle of 130 degrees or more with the diaphysis; hence, functional lengthening. The *coxa valga* resulting from the operation makes up for the shortening caused by the sinking of the neck produced by the traumatism.

Nevertheless, in such cases, do not rely on orthopædic treatment only; too often, in some cases of severe forms of *coxa vara*, surgical treatment is the only course admissible.

What should this Surgical Treatment be ?

What has not been proposed and done, in the way of operations, for coxa vara ? Some surgeons have gone so far as to resect the head and the neck of the femur, without remembering that the only result of this severe operation would be to replace the existing lameness by another lameness, generally more unsightly.

To-day, surgical treatment of coxa vara means in all cases,

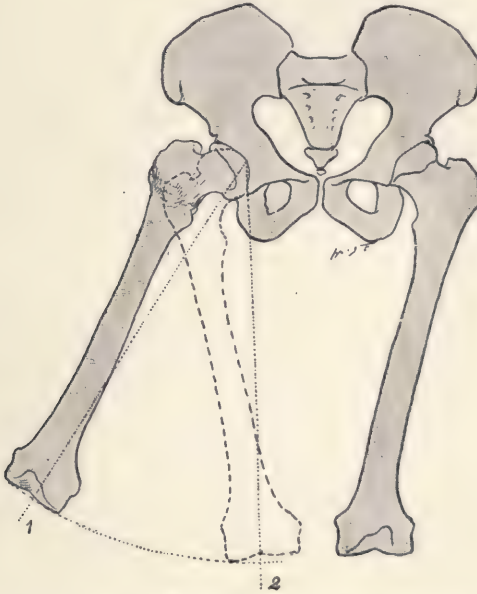


Fig. 1125.—Position after union : (1) Position when coming out of the plaster ; (2) Position for walking : the knee will be on a level with its fellow and thus can be seen the lengthening produced by our intervention.

osteotomy ; and the only point worth discussion is whether it should be linear or cuneiform.

The first, *linear osteotomy*, is easier, quicker, and simpler ; as it can be done subcutaneously, it is hardly an operation. Keep to it if you object to an operation on the femur by the open method.

The bone is divided immediately below the trochanter (this is *always much easier*). The osteotomy should not be exactly

transverse, but rather slightly oblique, downwards and inwards. Only two-thirds of the thickness of the femur are cut by the osteotome; the last third is broken by osteoclasis.

And thus very fair results may be obtained.

But cuneiform osteotomy by the open method will secure a greater advantage; and it will remain a simple operation, provided it is made below the trochanter (even immediately below) and

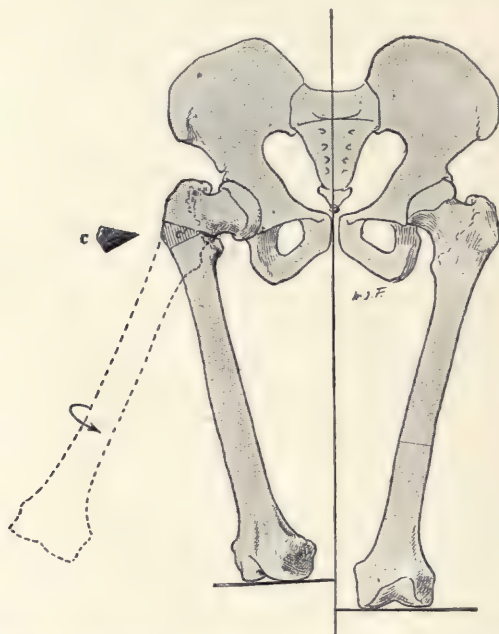


Fig. 1126.—Cuneiform osteotomy. C. segment of bone resected (shaded). (See text, p. 1066, as to the dimensions to be given to the osseous wedge.) Position taken by the inferior segment after osteotomy.

performed in 2 stages, at one month's interval, when double. It would no longer be simple, or at least not surely so, if it were made at the level of the anatomical neck, or in the thickness of the trochanter—very much hypertrophied, and if it were performed at a single sitting on both femurs.

Is there really any need to demonstrate the advantage which is gained by cuneiform osteotomy?

Take your walking-stick and suppose you cut out a wedge-shaped piece, here, opposite to the bend, but (fig. 1122) not quite through the stick, and so as to leave intact some of the wooden fibres. Suppose then that you *straighten the bend* as if you wished to give your walking-stick a straight shape. It is obvious that by *thus opening more and more these compasses* with unequal sides, you produce at the extremities (A and B) *a greater and greater widening*.

You may try the experiment with cardboard. Cut the card in the shape of a femur with coxa vara; remove from it a wedge at the place chosen and straighten it; it will give you the requisite lengthening. The lengthening will be all the greater according as the original angle of the diaphysis and neck is more acute. Another conclusion is, that the more highly situated is the apex of the wedge resected the greater will be the lengthening. Calculation and the divider will equally lead you to the same result.

In practice, therefore, we perform resection *immediately below* the neck. It is, moreover, the only method which allows us to obtain the most complete straightening of the femur. We shall thus gain a twofold advantage, the maximum lengthening of the leg, and the minimum deviation of the line of the femur, and the operation will nevertheless remain practically as simple as if it were performed lower down.

Thanks to our intervention, the trunk will be lengthened by straightening itself. Before the operation, the child "ducks," the trunk twists on both sides, the vertical position is always changing. When the point of the trochanter no longer abuts on the iliac bone, the vertical position of the trunk will rapidly become that preferred by the child. The height of the shoulder will be raised by the amount of *the lengthening of the leg, the straightening of the leg towards the vertical, and lastly the straightening of the trunk* (3 factors).

Evidently the principal benefit will be derived from the possibility of effecting the different movements.

And now a few words upon the operative technique.

Technique of Cuneiform Osteotomy

The patient is laid on the sound side, so that the external aspect of the affected hip is uppermost, in a good light.

Over the centre of the external face of the trochanter, one traces a vertical incision of about 5 or 6 centimetres, the upper extremity of which corresponds to Nelaton's line—which goes from the anterior superior iliac spine to the ischium.

With the first stroke the skin is cut through; a second stroke

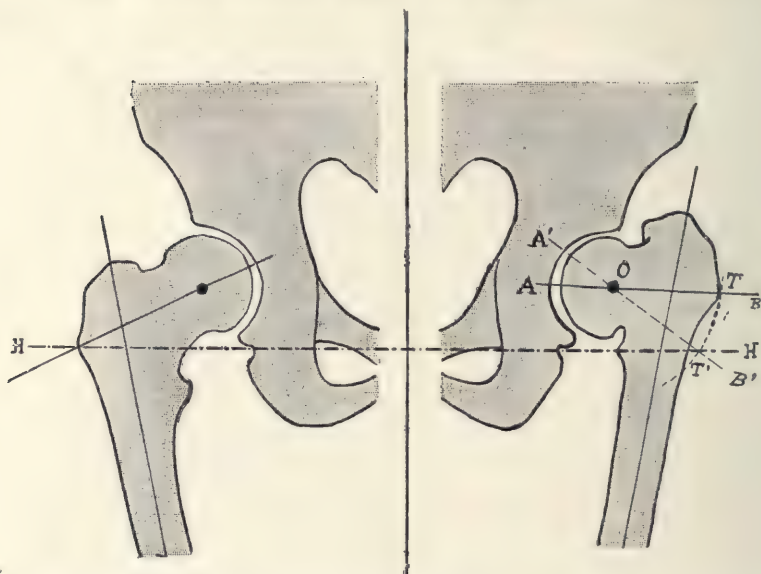


Fig. 1127 and 1128.—To find the angle of the wedge to be resected in early coxa vara. In order to equalise the respective functional lengths of both femurs, the point T, marked on the left side, must be brought on a level with the corresponding point on the right leg, *i.e.* to the horizontal line H H, perpendicular to the axis of the body, namely in T'. To reach this new position, after osteotomy has been performed and union obtained, this point T will have described part of a circle (dotted lines) the centre of which coincides with the centre of rotation (O) of the head of the femur. A line joining the centre of rotation of the head to this new point T', will show the direction of the new axis of the superior extremity of the femur, after correction; the angle formed by the new axis with the old one, AOTB, will give exactly the angle of the bony wedge to be removed.

carries the bistoury right down to the bone, which lies at a depth of 1, 2, 3 centimetres, according as the patient is thin or stout: the skin is separated from the bone chiefly by the panniculus adiposus, more or less thick, whilst there is only a *thin* layer of aponeurotic, muscular, and tendinous fibres.

A third stroke of the bistoury divides the periosteum for a length nearly equal to that of the cutaneous incision. Then with a flat

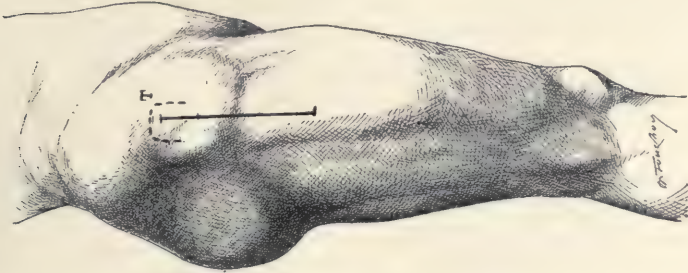


Fig. 1129.—Cuneiform osteotomy, incision of 5 or 6 centimetres, the superior extremity of which corresponds practically to Nelaton's line (a line which reaches from the iliac spine to the ischium).

rugine one fashions two periosteal flaps; one goes as far as the two edges of the external aspect of the bone, so as to expose completely the

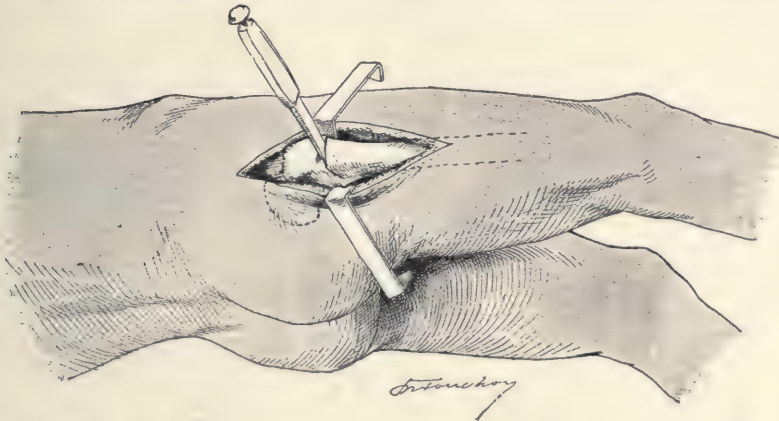


Fig. 1130.—Cuneiform osteotomy (continued). First incision of the bone. The cutting edge of the osteotome is placed at the point corresponding to the superior limit of the osseous wedge to be removed. The instrument is inclined above downwards at about 25° with reference to the surface. A few strokes of the mallet bring it to the desired depth.

full width of the femur to be resected. This width (or diameter) is from 2 to 3 centimetres, according to the age of the patient. You must have an osteotome, or a strong cold chisel, of about the same width,

so as to enable you to make a rapid, neat, and clean section of the whole width of the bone.

What are the superior and inferior limits of the base of the wedge to be removed? They differ according to the case: figs. 1127 and 1128 give them; they should be proportionate to the deviation and to the degree of abduction you wish to obtain. In a word, the angle of the opening of the wedge must be equal to what is wanting at the angle of the neck and diaphysis in your patient, to attain the normal

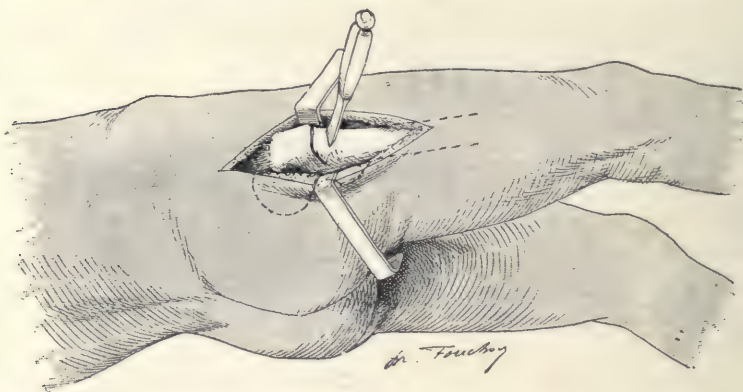


Fig. 1131.—Cuneiform osteotomy (continued). Second osseous incision according to the angle required. The edge of the osteotome is placed parallel to the first incision. At the level of the inferior edge of the wedge it is inclined at 25 degrees, and cuts through the bone so as to meet the deep part of the first incision.

angle, which is of 130° ; if the angle of the coxa vara is 80° the angle of the bony wedge will be $130^\circ - 80^\circ = 50^\circ$.

You could also determine the proper angle of the wedge by feeling your way—removing, little by little, shavings of bone, until the abduction of the thigh reaches about 45° .

Or, more simply still, you may calculate (as this is generally sufficiently exact) that the *base* of the bony wedge will be slightly over 1 cm. (say about $1\frac{1}{2}$ cm., in a child under 10 years, and of about 2 cm. in patients over 10 years old).

The *depth* of the wedge will be $1\frac{1}{2}$ or 2 cm. in children under 10 years; $2\frac{1}{2}$ cm. in those above 10 years of age.

Knowing these two dimensions (depth and width of the bony wedge) it will be easy to find the degree of obliquity to be given the

osteotome (the superior and inferior cuts are oblique in an inverse direction; but they must have the same obliquity in order that the two sections in the bone correspond exactly when in apposition).

Need I say that you must have an osteotome not only broad but strong, as well as a good mallet?

The osseous wedge being removed, the femur does not break yet; there still remain at its deep part some osseous fibres which support it; you break them by osteoclasis. In order that they give way without a strain or traumatism to the patient, the osseous cut

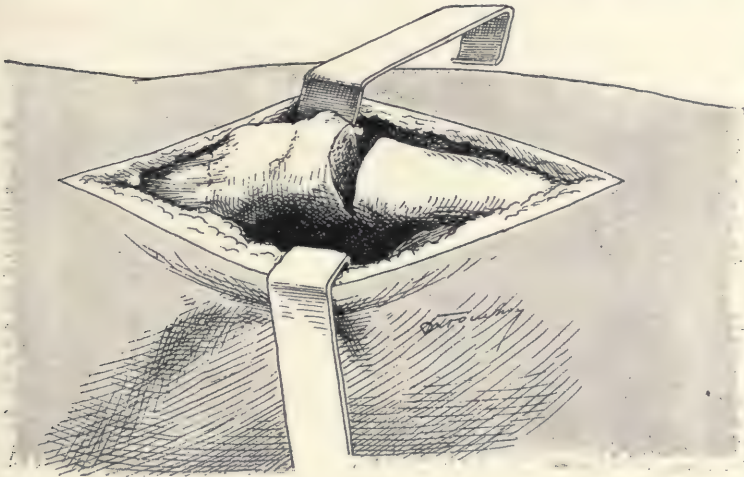


Fig. 1132.—Cuneiform osteotomy (continued). The osseous segment, included by the two incisions of the osteotome, is removed; it remains only to complete the section by an osteoclasis.

made by the osteotome must be of a depth of about two-thirds of the thickness of the bone.

As soon as the bone is broken (by osteoclasis, and you know when it breaks by a crackling, always very distinct), you bring the two surfaces into contact.

Remember that you will nearly always be hindered in this movement of abduction by the resistance of the contracted fibres of the adductors; but if you persist, if you renew the movements of abduction, you will find that the muscles will relax, little by little.

You help this relaxation by massaging and kneading the muscles ; if need be, rupture their insertions at the pubes.¹

Sometimes (rarely) the articulation of the hip is somewhat stiff or ankylosed and, in order to be able to move the femur outwards, you may have to break some osteo-fibrous adhesions as well ; but you



Fig. 1133.—A type of commencing *coxa vara*. Patient 12 years old ; radio taken April the 5th, 1905. It can be seen that the angle formed by the axis of the neck and that of the diaphysis reaches hardly 88 degrees, instead of 130 degrees. The whole of the neck is bent down, on both sides, the characteristic sign of essential *coxa vara*. See fig. 1134, how the disease has progressed in 6 years, in spite of extension and partial rest, and in spite of a general anti-rachitic treatment.

will achieve this by the same manœuvres of abduction, which stretch, at the same time, the contracted articular capsule and the shortened tendons ; continue the manœuvres of abduction as far as is necessary to effect the contact of the two refreshed osseous surfaces.

¹ See technique of this rupture, p. 446 and p. 737.

After that, you immobilise the thigh in an abduction of 45° ; but previous to that, it goes without saying, you have made the toilet of the wound, removed all the small osseous debris, ensured hæmostasis and sutured the skin with catgut—without draining, unless there are present cavities or loculi causing you to fear the formation of a hæmatoma.



Fig. 1134.—The same child (7th July, 1911), six years later; compare with fig. 1133 in order to realise how the deformity has increased during the last 6 years. The angle of the neck and diaphysis is only about 50° . The trochanter, very much hypertrophied, abuts against the iliac bone in the movements of abduction (see fig. 1135).

To apply the plaster, the patient is again laid flat on his back. The apparatus is similar (as to shape, dimensions, and mode of construction) to the large plaster for hip disease, reaching from the waist to the toes.¹ It is left in position for $2\frac{1}{2}$ months.

In the case of bilateral coxa vara the operation will be performed,

¹ For all the details concerning the technique of construction of a large plaster, refer to p. 422 and following.

as we have said, in two stages, allowing an interval of 1 month between the two interventions.

After having been 2 or 3 months in the plaster, the limbs are freed; they will spontaneously return, little by little, to parallelism. There only remain to be carried out, massage, active and passive movements, progressive walking exercises, with crutches at first, then with sticks, and lastly with only one ordinary walking-stick.



Fig. 1135.—Same child—after surgical operation; radio taken on September the 5th, 1911—two months after the operation, when the plaster was removed; both limbs are still in abduction. On the right side—a linear osteotomy was done—the osseous union is firm, but there is a slight over-riding of the two bony fragments. On the left side, on the contrary, where the osteotomy was cuneiform, osseous union has taken place without displacement or over-riding (which shows well the superiority of cuneiform over linear osteotomy as regards the orthopædic and æsthetic result) (see fig. 1136).

The treatment is finished about 6 months after the operation.

The functional results thus obtained are perfect, or nearly so.

Parents have brought to you patients who “waddled” at each step; you return to them children whose gait is normal.

In a word, we know to-day how to cure the functional troubles of coxa vara: 1st, by simple medical treatment (with rest and extension, for light cases); 2nd, by orthopædic treatment (stretching the

adductors and a plaster) in medium cases ; 3rd, by surgical treatment (linear or cuneiform osteotomy) in more serious cases.

And—which is not the least advantage of this healing therapeutics—it can be applied by all observant practitioners.



Fig. 1136.—Radio taken 5th Feb. 1912, 6 months after the operations. One sees that the angle of the neck and shaft has opened and that it actually measures about 120 degrees, that is, nearly the normal. The point of the trochanter is now lower and further away from the iliac bone : the same alteration has brought the inferior insertions of the glutei muscles to their normal level. Here, then, is the anatomical cure. As to the functional result, it also is perfect—though not quite so on the right (linear osteotomy) and there is a shortening of 8 millimetres on this side, whilst the cure is absolutely faultless on the left, where the osteotomy was cuneiform.

AN IMPORTANT NOTE ON COXA VARA IN ADOLESCENTS

I do not wish to close the chapter on Coxa Vara without a reference to my studies and observations (recorded in a memoir in the *Quinzaine Therapeutique*¹), which have led me to the

¹ See *Quinzaine Medicale*, December, 1912.

absolute conviction that the essential Coxa Vara of adolescence

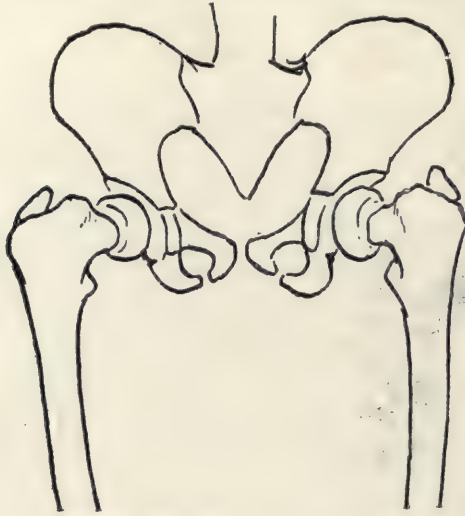


Fig. 1137.—Tracing from radio, fig. 1133.



Fig. 1138.—Tracing from radio, fig. 1134.

in an exceedingly rare condition, and that in practice almost

invariably the condition treated under this designation is simply a

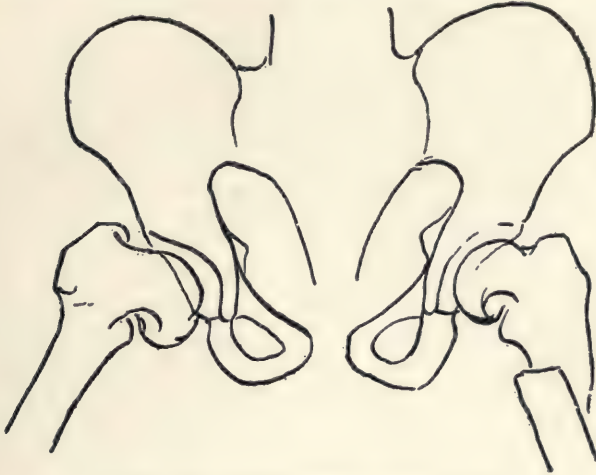


Fig. 1139.—Tracing from radio, fig. 1135.

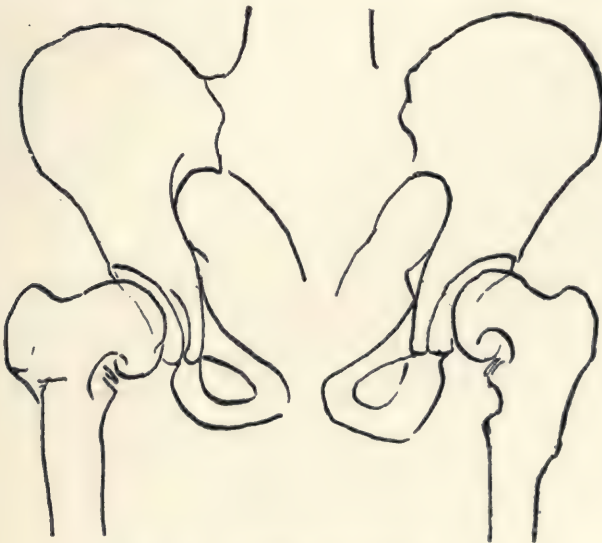


Fig. 1140.—Tracing from radio, fig. 1136.

fracture of the neck or a detachment of the epiphysis, which has

been wrongly diagnosed, or maybe, the result of a fracture or a displacement of more or less long standing, which has gone unrecognised. I have come to the conclusion that almost all the cases are identical with those radiograms which are given on pages 1054 and 1055, which were sent to me by a great master as "hip disease or coxa vara," as he somewhat hesitatingly described them. In reality they were neither the one nor the other, but were fractures of the neck (as he was convinced after examining the radiograms), fractures which had been unrecognised, the initial traumatism having been so insignificant and interference with the function of the limb so slight. Imagine, this young man had not ceased to walk for a single day! We have had other patients sent to us with a diagnosis of hip disease or coxa vara, in whom we recognised a separation of an epiphysis or a fracture of the neck, and which we immediately treated as such: that is to say, under chloroform by manœuvres of reduction appropriate to such fracture, by carrying the limb into very marked internal rotation and abduction, we have in this way *completely cured* in a few months—after the condition had been uselessly treated as coxa vara or coxalgia for six months, a year, and even longer—by rest and cod-liver oil.

These complete functional cures, by themselves alone, without even taking into account our unquestionable radiograms taken before and after, show how well-founded our opinion was.

Practical conclusion: When a patient, especially an adolescent, comes to you with the diagnosis of coxalgia which has appeared suddenly after some slight injury and a deformity which recalls that of coxa vara, showing a *shortening* from the very onset,¹ and at the same time external rotation, or with a radiogram of a so-called coxa vara, think immediately of the possible, and even probable, existence of a fracture of the femoral neck, or of a detachment of the epiphysis; carry out the manœuvres of reduction described in the preceding chapter *à propos* fracture of the neck, and immediately after those manœuvres, take a new radiogram in order that you may see that it has quite resumed its normal position, in which case recovery of function will follow—always—as shown in the case figured on page 1054, which illustrates so well what we said there that we may refrain from giving any further explanation and other observations and proofs which we have collected of late

¹ Whereas in real coxalgia, at the onset, there is, on the contrary, lengthening of the affected limb.

years. And if the reduction in your case is not for the time being possible, do not conclude that you are dealing with an old fracture, because it may be a fracture already united; you then will treat the case in the manner described on page 1057 and onwards. This is an encouraging conclusion to arrive at, seeing that it allows you to hope for complete and early cures in patients very often considered to be incurable—by those who treated them previously.

ON THE INEFFICACY OF HELIOTHERAPY

IN THE LOCAL TREATMENT OF EXTERNAL TUBERCULOSES

Summary.—The part played by the action of the sun's rays has been very much exaggerated, and even misrepresented, by certain writers; they are to-day, as they always have been, an adjuvant, one of our very numerous adjuvants, but nothing more, in our fight against the external tuberculoses. Their action, good against superficial tuberculous sores, is nothing at all against the closed tuberculoses which the solar radiations do not even reach, and very often bad in the case of deep-seated fistulæ (Hip Joint Disease, Pott's Disease, etc.).

Yes, bad; by the side of their advantages, there are inconveniences and dangers which may be fatal by bringing about purulent retention, tuberculous generalisation, meningitis, etc. (Vignard). In order to pass judgment upon heliotherapy, if we question: 1st, Pure Science; she replies by the voice of the greatest authority, that of Daniel Berthelot (1914), that "heliotherapy has not up to the present been submitted to anything but the laws of a gross empiricism and has no real scientific basis.

2nd, Clinical medicine; this applies to us:

(a) As to the percentage of deaths.

The general statistics of Berck, where heliotherapy has been given only the rôle which is due to it, that of an adjuvant, show 1 per cent. of deaths—whilst the statistics of those specially following the treatment by heliotherapy alone show four times as many, or 4 per cent. of deaths, and they would show still more than that, had its advocates not had the good sense to continue to follow in most points the methods they had learned at Berck,

methods which for more than twenty years have proved successful and changed entirely the prognosis of the great osseous tuberculouses which kill—Hip disease, Pott's disease, etc.

The principal points in the Berck methods are, as you know, never any surgical operation, but puncture and injections. Rest and perfect immobilisation by means of plaster apparatus. No violent corrections, but progressive corrections, continual life in the open air, overfeeding—rational and under supervision.

(Note that we do not here speak of seaside treatment, but only of that general treatment which every practitioner can carry out anywhere.)

And it is their fidelity (relative) to the methods learned at Berck which explains the successes (relative) of the adepts in heliotherapy; there is no other secret in the results which they are able to show.

The more they adhere to the methods of Berck, the better will be their general statistics; the further they depart from them the worse they will be.

So much for the percentage of deaths.

(b) As to its shortening the duration of disease, we think with all our colleagues at Berck that heliotherapy makes no difference.

(c) As to its promoting the discharge of sequestra, we think with Broca, that heliotherapy, contrary to what has been said, has no special effect.

(d) With regard to its soothing the pains of osteo-arthritis, we think with Redard, that it is untrue to say that the value of heliotherapy is greater than, and even as much as, or anywhere near, that of our immovable plaster apparatus.¹

(e) As to the quality of the orthopædic results, we consider (again with Redard) that heliotherapy in preventing the use of

¹ The plaster is the best analgesic, because it is the best antiphlogistic and the best immobiliser. More than that, we can apply by means of the plaster a continuous extension. This is very advantageous in certain cases, and it is easily realisable by reference to a personal experience which we have described in our "Orthopædies and Surgery in War," as to the treatment of fractures, in particular of fractures of the thigh.

immovable apparatus in a great number of cases, has done, on the whole, much more harm than good to the orthopædic value of the results. Those classical apparatus assure far better results than any other treatment in the correction of gibbosities, the straightening of the limbs, the safeguarding or the restitution of the function of the joints.¹

It is especially in Pott's disease that Insolation, in sacrificing immobilisation by the plaster corset, has done a hundred times more harm than good with regard to the cure of the focus and the quality of the cure.

This summary gives you the essential points. We will now enter into some details.

Insolation is fashionable nowadays in certain circles and some foolish physicians have been desirous recently of proclaiming the practice, which is as old as the hills, a veritable panacea for all diseases, and particularly for external tuberculoses.

Because cultures of tuberculosis in a test-tube exposed directly to the sun are favourably modified thereby. . . . As if it were permissible to conclude from this, what occurs in the living organism. If the ultra-violet rays kill the bacilli they may equally well destroy the living cells ; so much for superficial tuberculous sores.

As to tuberculous foci closed or deeply placed, it is quite

¹ Upon the whole, plaster judiciously employed, remains the best preventive treatment of ankylosis. We have written in our treatise on *White Swellings* (Masson, publisher) : " If the parents say to you : ' We are afraid of plaster, because we are afraid of ankylosis,' you reply to them : that which causes ankylosis is infinitely less the plaster than the grave and prolonged inflammations which may supervene ; and the best means of avoiding ankylosis would be to suppress the inflammation as quickly as possible. But, it is certain that with a plaster and injections into the joints, the cure will be much more rapid and more certain than with any other mode of treatment. It is for that reason we have recourse at once to injections and the plaster. With that treatment, the cure of the focus is generally attained in four or five months, after which we remove the plaster but still leaving the patient at rest. (See Chap. VII., *White Swellings*.) In four or five months, especially in children, the movements of the joint have not had time to be lost, or at least of being lost without returning.

So much for the employment of plaster in tuberculosis of the limbs. As to Pott's disease, the necessity of plaster is still more beyond dispute, as we shall see farther on.

another matter, since manifestly they are beyond the attack of the solar rays.

In fact, without it being necessary to repeat here how heliotherapy acts, it will be sufficient to recall the fact that the skin is not at all permeable to the ultra-violet or therapeutic rays. Under the influence of the solar radiations there is soon a pigment produced which acts as a screen and increases still further the action of the skin in resisting the passage of the rays. It is, indeed, strange, as remarked by Prof. Nogier, that the ultra-violet rays are spoken of as having an action on the deep tissues.

So that, putting on one side the tuberculous ulcerations of the skin where direct Insolation may be efficacious in the same way as so many other physical or chemical agents directed against the lesion, and are thus able to act upon them—pure air, sea air, warm air, air charged with medicaments, light in its diverse modes of application ; Finsen light, electric light, thermal and mineral waters, and those waters called cicatrising : Barèges, Salies, etc., as X-rays and the many topical remedies and antiseptics extolled against the sores, and of which each has its partisans, because each counts its successes—putting aside, I say, the cutaneous ulcerations against which the solar radiations are able to act, like many other agents, sometimes not very well, sometimes better, according to the case, we consider that it is a grave and dangerous error to believe, or make to believe, that Insolation is the best treatment for the External Tuberculoses.

And our opinion is also that of a large number of those who have experimented most extensively with this method of treatment, and who are well rid of their first illusions on the subject. Unfortunately, owing to the trenchant, repeated statements made by the blind advocates of Heliotherapy, a stream of erroneous ideas has been created in certain circles which has led to the grossest heresies and has already caused those advocates to say and do many foolish things. Is it not true that surgeons have written : “ We are now able to operate upon the tuberculoses with *impunity* because the fistulæ left by our operations will be

cured by the sun." In other words, "The sun will repair our blunders"! You will see farther on that they are not repaired! Doubtless, in his desire to outdo every one, a physician has even dared to say that a child suffering with Hip Disease, *with complete destruction of the head of the femur*, having been submitted for six months to the sun's rays, was cured *completely, and without any shortening!* No, no, not that, in the name of common sense! Even better or worse than this has been heard of. Following on rather vague articles on heliotherapy, it has been repeatedly stated for physicians to believe that Pott's gibbosities have been straightened simply by exposure to the sun (I have heard this myself), and that now the sun absorbs the humps! What an illusion, I was going to say ineptitude, which ought to force a smile in all those possessed of an ounce of the critical sense, and doubtless does in the authors of these beautiful cures themselves, so-called cures obtained without mechanical means.

It is amusing certainly, but how dangerous, however, to make such inexact statements and so lead to such absurd and mischievous deductions! And into what errors with the worst consequences may practitioners to-morrow fall, who follow to the letter those to whom heliotherapy is the panacea for the external tuberculoses! The deductions they wish to draw—and several have already appeared, as we shall see—is that a subject of Pott's disease walking about nude in the sun will recover better than those whose backs remain at rest in a good immovable plaster; or, further than that, that a case of Pott's disease with an abscess opened by the surgeon, or spontaneously, will be cured more certainly and more quickly than an abscess which has been punctured and injected, but not submitted locally to heliotherapy.

I wish to inform those practitioners of Heliotherapy, since they appear to be ignorant of the fact, that the physicians who have made most use of the sun cure declare that they had ten times more deaths among those patients going to them with fistulæ than among others; thus, Professor Bardenheuer and the Swiss

doctors have loyally written : " We are entirely of opinion with M. Calot when he lays it down that to open tuberculous abscesses, or allow them to open of themselves, is to open a way to death." The fundamental dogma, without which too often there would be no safety is, therefore, that fistulæ should never be produced or be allowed to originate spontaneously.

After that, can any one still persist that Insolation can be of any service in the **local treatment**¹ of the external tuberculoses? No. But let us know what really is its value, so that we do not

¹ Note that we are here speaking of local treatment only. As to general treatment, insolation, without being indispensable like air and light (Berthelot), appears to be favourable in most diseases if it is wisely and properly adapted to each case, failing which it risks being distinctly harmful, bringing about fever, congestions, bacterial generalisations, and even arterio-sclerosis; but with these reservations and restrictions it may be used. In reality it is made use of everywhere, with, it is true, much less scenic mystery and "business" here than elsewhere.

At Berck, from the very beginning, the children have lived from morning till night on this immense naked beach, in a continuous bath of pure air and light. We have, therefore, always associated the action of sunlight with seaside treatment without any pretence of excluding it.

And as to those who believe in the particularly favourable signification of pigmentation, which by the way is contested by a certain number of biologists, we may add this fact which has for long been noticed; that nowhere are children tanned as they are at Berck owing to the united action of salt air, grand breezes, bright light, and the generous sunshine reflected by the marine lake and the white sand of the beach.

That is to say that one has not learned the actual method of using the sun's rays in the wise and prudent way in which they should be. And if some people extol heliotherapy at high altitudes, we reply to them that Dr. Barbier, physician to the Paris hospitals, and the members of the Congress assembled at Cannes in 1914 have shown that heliotherapy at the seaside is of still greater value.

1. It is in the case of multiple tuberculous ulcerations that insolation appears to work marvels—these are the cases which have made its reputation, because these multiple ulcerations which are in fact so happily modified by insolation, have a very malignant appearance which strikes the general public very much, and even a good number of practitioners not acquainted with them. But, you must know that in spite of their apparent malignancy they have really a very favourable prognosis and are always cured **because they are not operated upon** (see page 950); they are cured by no matter what medication, by fresh air alone, by the X-rays, by various local applications, and they may even cure themselves. Therefore, to triumph over such results is, so far as the adepts in insolation are concerned, to triumph too cheaply.

ask of it, any more than of any other therapeutic agent, more than it is able to give us. Unless we do so we expose ourselves to most troublesome deception. If its action is good against some lesions, it is useless or even bad against certain others.

Besides its advantages, it has contra indications and even dangers, which may prove fatal.

(a) *It is good* generally, against tuberculous ulcerations of the skin, because the ultra-violet rays may really attack them, against ulcerated cervical adenitis, ulcerated lupus, and ulcerated spina ventosa. It acts here, as we have already said, in the way every one knows local applications, antiseptics, and all physical and chemical agents do. And one has seen that all the medications made use of in the case of spina ventosa, for example, bring about the shedding of sequestra. More exactly, nature alone is generally sufficient for this, the separation being brought about spontaneously ; it is not, therefore, true to say, as has been said thoughtlessly, that it is due to heliotherapy.

(b) *Its action is nil* in the closed tubercloses, for instance, in a tuberculous knee-joint, Pott's disease, hip-joint disease, because the solar radiations cannot reach them.

How many impartial physicians, as, for example, Dr. Cayre of Berck, after having great hope of heliotherapy, recognise to-day its complete impotence in all the cases we have mentioned !

(c) *Its effect is bad* very often in the case of deeply seated fistulæ (hip-joint disease or Pott's disease). Under the influence of the solar radiations the cutaneous ulceration and orifices of the long fistulous tracts tend to granulate, and as granulation proceeds without the tuberculous foci being extinguished, the secretion of pus continues. The pus increases in virulence owing to the septic germs retained in the closed pocket. And then what happens ? Either by a hasty drainage the danger is averted, or, the drainage being insufficient, the condition will be aggravated or may even distinctly compromise the condition of the patient by setting up all the classical phenomena of septic

absorption; evening rise of temperature, albuminuria, toxæmia, and progressive and fatal breaking up of the organism.

And these are not theoretical views. We have been called in several times to patients near by who had been treated by Insolation, and who, far from profiting by the treatment (commenced by very careful surgeons), had suffered severely from it; without mentioning the febrile symptoms, or the sun-burns of the skin caused by heliotherapy, one can cite cases in which death has supervened, not in spite of the treatment, as some people have attempted to assert, but because of it.

It is useless to insist further, but all this had to be stated. It appeared to me necessary to clear up the matter and to appraise this treatment at its true value. My duty is to put you on your guard against the mirages, the exaggerations, and the errors of this new religion which, after all, is not new.

Never forget that in the treatment of the Surgical Tuberculoses there is a *first principle* which dominates everything, it is never to open tuberculous foci. A *second principle* is evidently to carry our remedies where the malady exists, that is to say in *immediate and direct contact* with the fungating lesions of the bones, or articulations, or glands, or soft tissues. It is a commonplace aphorism which we have been forced to recall since some persons appear to have quite forgotten it. Our modifying injections or fondants attack the foci directly, whilst Insolation does not.

First example: that of a **suppurated tuberculous focus**. An abscess of the hip-joint or in a case of Pott's disease. There is no comparison possible here between the local treatment by punctures and the treatment by insolation.

Every practitioner familiar with the technique of punctures and injections may boldly wager that, with this treatment which, of course, does not exclude a good general treatment, the abscesses will be cured in from two to three months (ninety-nine times in a hundred cases), whereas the treatment of abscesses by Insolation and a good general treatment, during which the

absorption of pus is taking place, will require a year or two, or more if absorption ever takes place at all, in arriving at a cure in 50 per cent. of the cases, without taking into account that cure by absorption, when it is obtained, is much less perfect,¹ less

¹ The so-called **spontaneous** cures (obtained without any puncture, or puncture without injections), cannot be complete, or rather **as a general rule are not complete**, at least, until several years.

As soon as there is no longer fluctuation perceptible over the abscess, it is said to be cured—which is a mistake, because this indicates simply that the liquid part of the contents is absorbed; but not that there are no more infecting germs in its wall; in reality there still remains for years, and often indefinitely, in place of the abscess (in its débris and cicatrices) a residue of caseous material, that is to say, an unextinguished focus which is always extending anew against the neighbouring parts, and worse still, is capable of conveying the germs to distant organs, the meninges or the viscera.

Observation shows us this: in cases where several years later opportunity has offered of making either a biopsy or an autopsy of one of these abscesses, apparently cured by absorption, the débris of tuberculous material has been found.

The first observation of this kind, a typical one, is that known as Dupuytren's. He having seen an abscess in one of his patients absorb spontaneously was led to the conclusion that the cure was complete. But the patient dying of pneumonia some three years later, Dupuytren found in the place of the abscess, thought during life to be cured, a small mass of caseous material, manifestly tuberculous. And how many observations there are on all fours with this we could refer to here. Quite recently we saw a patient, attacked by Pott's disease, who underwent the cure by solar radiations six years ago, and was said to have been cured of an abscess of the back. But there was still to be found in the situation of the abscess supposed to be cured, a definite pulpy mass, as large as a nut (note that, six years ago, the abscess had never exceeded the size of a nut). The cure of the abscess was therefore only apparent. The liquid part of its contents was absorbed, but not the caseous part, the active, the infecting. (We proposed to the patient to use for this residuary abscess our fondant injections followed by punctures, and assured him of a real and complete cure in two or three months.

Well, it is the contrary which one observes when one has treated a cold abscess by the classical number of modifying injections, that is, seven or eight, as has been described in Chap. III. In this case the cure is real and complete, and always unmistakable.

In the site of the abscess, one only finds pure fibrous tissue without any trace of tuberculous elements after careful examination, histological and microbiological, which we have frequently had made, in particular by M. Noël Fiessinger.

The disappearance of every tuberculous element after treatment by injections has been definitely proved, not only in the case of abscess, but also in the case of dry or pulpy tuberculosis, of the knee, for example, and in the case of tuberculous fistulae.

Recall the proofs given (see p. 122) by Coyon, Laurence and N. Fiessinger

certain and less definite than that which has been obtained by punctures and injections, that is to say by expulsion outside the body of all the morbid products.

Second example: that of **a dry or pulpy tuberculosis**; a closed white swelling of the knee. The same reasoning applies here. To submit the knee to the action of the sun's rays is equivalent to painting it with tincture of iodine; in reality, it is only submitting it to a general treatment, which, in order to cure takes years, should it be cured, for the cure is doubtful, and by no means permanent; whilst with our injections (which do not exclude a good general treatment) we convey the remedy up to the tuberculogenous wall—the internal surface of the synovia and up to the articular surface of the bone; we are able to modify the granulations, or soften them, in order later on to evacuate them by the syringe, this second mode of cure being, moreover, much the most certain. Here, also, there is no comparison possible between the local treatment by injections well done, and the treatment by Insolation. See at page 496 of this book, the very eloquent statistics of the Cazin Hospital at Bereck, which include those of all the white swellings, to the number of 311, of which 176 were of the knee, admitted during a period of ten years, all of them treated by our intra-articular injections. All of them have been cured without any exception, and cured

(from the laboratory of M. Robin) as to the destruction, and the mode of destruction, of bacilli from cold abscesses treated by modifying injections. The bacilli are destroyed by some proteolytic ferments which liquefy and digest the albumenoids, that is to say, the very substance of the bacillus. Sometimes the ferments are produced directly by the injections, for example our injections of pancreatin which, I may say in passing, we were the first to make in the year 1903, that is to say, three years before the Germans (see our communication to the Congress of Surgery, October 1903; the first publication by the Germans was in July 1906). Sometimes the ferments are produced indirectly by the injections (in the case of injections of creosote or naphthol), which act first by bringing about in the abscess a considerable afflux of polynuclears, then by destroying them in order to set at liberty their proteolytic ferment, which is, as we have already said, the agent of liquefaction and digestion of the bacilli. To recapitulate: The rule in the case of spontaneous absorption of the abscess is an apparent but not a complete cure. The rule in the case of treatment of an abscess by injections is cure complete, real, and permanent.

without a single amputation, or even a resection, cured in ten or twelve months on an average—cured nine times out of ten with preservation of the functions of the joints. Could a better series of statistics be shown, or any simply as good, obtained by any other method whatever?

Third example : that of a tuberculous **fistula** ; of hip disease, or of Pott's disease, in which the sun's rays are unable to reach the long tract measuring ten, fifteen, twenty centimetres or more, while we have been able to attack them with our injections of liquid or of pastes, the formulæ for which are given on page 171.

No opening of tuberculous foci, modifying injections, plaster apparatus—these three dogmas will continue in existence until the anti-tuberculous vaccine has been found, while Insolation, in spite of the noise which has been made about it, in spite of its title so suited to impress the mind of the general public, is flagrantly ineffective in nearly every case, without mentioning those cases in which it is dangerous. I finish where I commenced ; the sun is an adjuvant, one of very many adjuvants, and nothing more. Be careful not to mistake the accessory for the principal and attribute to Insolation cures which are due in reality to practice and methods employed concurrently with it, namely, the practice and methods already described and made use of at Berck, and proved successful for twenty-five years !

The Necessity of the Plastered Corset in Pott's Disease

I have said that this method of Heliotherapy has lead to the commission of mistakes.

Last year a child of six years suffering with Pott's disease was sent to us. He came from the neighbourhood, and he had a very marked curvature. The parents said to us : "Two years ago he began to be treated for pain apparently between the shoulder blades, he had not the least sign of a boss, and look at him now, with this great projection ! The doctor who treated him declared that exposing him to the sun regularly, and keeping him at rest would be sufficient to cure him."

And the doctor had supervised that daily exposure of the back to the sun without doing anything whatever to fight against the appearance, and then the progress, of this curvature, so enormous to-day.

It is pitiful. Needless to say that without loss of time we placed the child in a large plaster corset with a dorsal opening for the compressions. His curvature, it is true, will not be exposed to the sun ; we are able, however, to promise that it will be arrested and effaced to a surety in a year or two.

But, you ask, cannot one arrive at a straightening of the curvature without using the plaster corset ? Yes, strictly speaking, in the same way that one can, as a matter of fact, keep in position a reduced congenital dislocation or a fracture without a plaster, replacing the plaster with irons, bandages, and straps, which is seldom done as the plaster is convenient and comfortable ; by causing a hundred times more pain in putting on and taking off the bandages every day, and even several times during the day and night, and leaving in spite of all precautions too much to chance, to the risk of an accident, without taking into account that one is constantly moving the seat of fracture, which is mischievous enough in the treatment of an ordinary traumatic fracture but is particularly serious in treating a pathological fracture such as is Pott's disease (see p. 251), because it affects the tuberculosis. Every traumatism (a shock or concussion) brings about the risk of inoculation and generalisation.

And what other advantages the employment of plaster has ! For example, the guarantee it affords us against the evil effects of shaking in the subjects of bronchitis and of whooping-cough. The Sisters of the Cazin Hospital at Berck, who formerly were on the hospital staff where they nursed cases of Pott's disease treated without plaster, but with bandages, and straps and cloth waistcoats, and upon frames, have said to us a hundred times : "Children not plastered, if they were attacked by whooping-cough, all died. To-day, wearing their plasters, our cases of

Pott's disease go through an attack of whooping-cough without ill results."

Personally, we have knowledge of two children attacked by Pott's disease in the cervical region and *not plastered*, who *died suddenly*, and whose death appeared to be attributable to the fact that they were not wearing plaster corsets, and to the very aggravating circumstances that, under the pretext of being treated by Insolation, they were turned on their sides, or on their backs, several times a day, with an imprudence bordering on negligence.

And if once a correction has been arrived at with a great supply of bandages and buckles, of cushions placed and replaced every day, and of attendants and nurses engaged to do this, and at the price of evil bed-sores supervening during the course of such painful treatment, we are not to be prevented from saying that the game is too risky and utterly useless, and we have the right to condemn those imprudent attempts due to snobbism, or to a desire which comes before anything else—that of satisfying the caprice of parents who show a stupid prejudice against the plaster.

But what can be said against the corset? For tuberculosis of the limbs, I admit that sometimes there are particular indications when plaster can be dispensed with, and we have given those indications. But here, where we are considering Pott's disease, there is none; because if the plaster rather favours ankylosis of two, or three, or four diseased vertebræ, so much the better; the cure will be all the more substantial and more permanent. As to the mobility of the dorsal spine, the twenty-two other sound articulations will supplement very easily and very completely the two or three rigid ones.

You see, then, that with the plaster corset the straightening of curvatures is regularly obtained—easily for the surgeon and agreeably for the patient!

Yes, agreeably, I repeat it. The treatment by the plaster is much the most agreeable treatment in existence because, in

assuring the stability of the trunk, it leaves to the patient an amount of real liberty and perfect security in such movements as are permissible. But, especially, once again, it is here the only treatment which gives, without any risks, certain and constant results.

In conclusion, to rely upon solar radiation, which in no wise can reach the focus in the vertebra, and to pass over plaster in the treatment of Pott's disease is a grave omission, and to dare to call it progress is a misuse of words!

Progress, yes—in the wrong direction, retrogression and a return to twenty years ago.

A Word on the Conservative Treatment of Tuberculous Peritonitis, and of Renal Tuberculosis

I. On the Conservative Treatment of Tuberculous Peritonitis

This is what we wrote twelve years ago : ¹ We have treated at Bercé twenty-six cases of tuberculous peritonitis in subjects of from two to twenty-two years of age. All the patients were cured with the exception of one poor little wasted child who arrived *in extremis*, and succumbed on the third day, and in whose case no hope of recovery was held out.

Cure has been obtained by us with a treatment, conservative and very simple, comparable in every way with that of tuberculosis of the articular serous membranes : life in the open air on the beach, rest in the recumbent position, immobilisation and support of the abdominal region by means of cotton wool and Velpeau crêpe bandages, and sometimes even a plaster corset ; and, as in the case of a tuberculous hydrarthrosis, punctures and injections, when there is ascites or a peritoneal collection encysted and easily accessible.

In two cases where we had decided to perform laparotomy, if a conservative treatment of a few weeks did not bring about

¹ "The treatment of Tuberculous Peritonitis at the seaside," International Congress on Tuberculosis, 1905, by F. Calot.

the disappearance of the effusion, we eventually obtained it within the time we had fixed, and thus were able to put the scalpel on one side.

II.—A Word on the Value of Conservative Treatment in Renal Tuberculosis

We believe, certainly, that Renal Tuberculosis can be cured without nephrectomy at the beginning (in a very respectable number of cases which we estimate at the least at fifty per cent.), with marine treatment (a continuous sojourn on the beach, hot sea-water baths, diet and medication).

Among other cases, we are able to cite that of a young girl whom we sent to one of our greatest masters of Urology ; he advised the immediate removal of the right kidney ; we refused to agree to this, before having tried, for several months, the conservative treatment above mentioned. It is ten years ago, and that patient has not been operated upon. Pus and bacilli disappeared in the fourth month. To-day she is cured.

Another case : that of an American lady also seen by a great specialist ; here, the only reason which deterred us from nephrectomy was the implication of both the organs ; the two kidneys being involved, we considered it our duty to restrict ourselves to conservative treatment (seaside and general) by way of palliation and without any hope of cure.

That was nine years ago. Here, again, the different symptoms improved regularly, although very slowly, under our eyes.

At the end of three years, this lady was able to move about and to lead a normal existence. Then she returned to America, whence she has written to us that she considers herself cured.

We think, therefore, that in Renal Tuberculosis a conservative treatment should always be adopted at the commencement, though it may not suffice in every case. Is there a criterion by which to know if this treatment should be persisted in, if so in what particular case ? Yes ; very naturally the clinical criterion.

If the symptoms subside the treatment should be continued ; if they become aggravated, nephrectomy should be decided upon.

But to say that the condemned kidney must be removed immediately in order to save the other, is not a sufficient reason ; would any one dare to say that the apex of a lung when that only is affected should be removed, under the pretext of saving the other from possible infection ?

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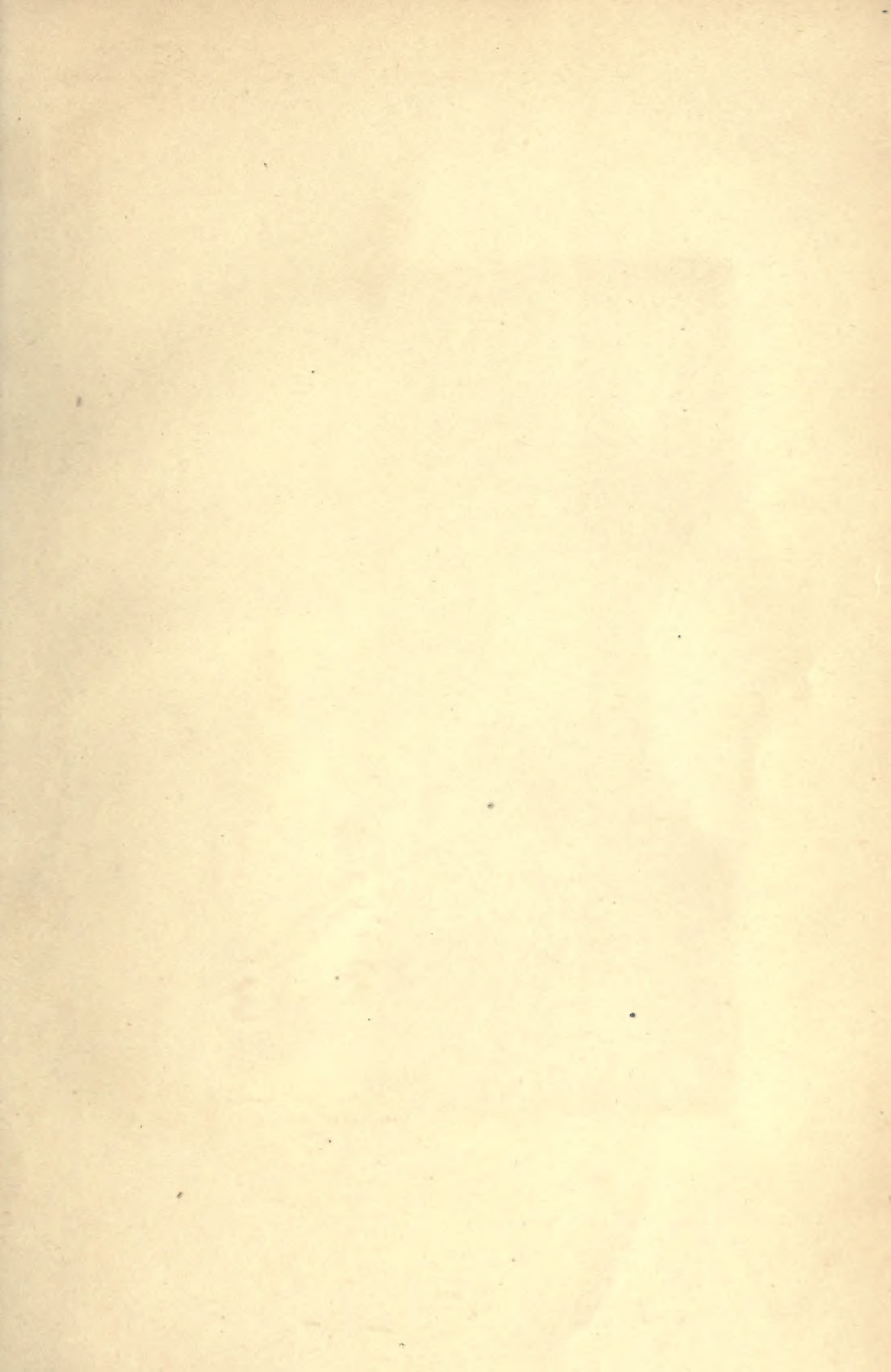
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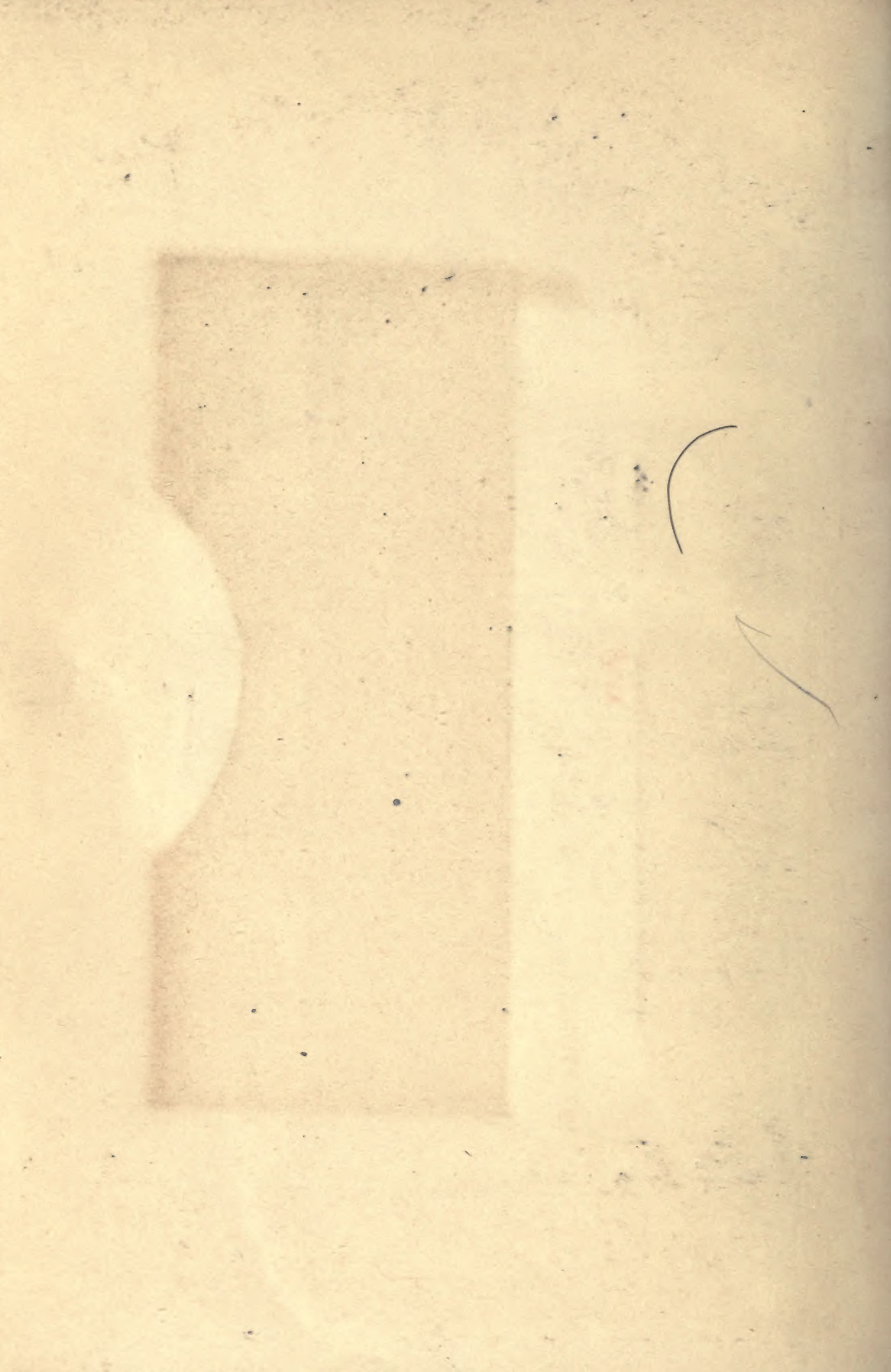
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